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VETERINARY MEDICINE

JUNE 1948

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Any animal of any age fed upon milk exclusively will sooner or later develop anemia.

* * * *

Nearly 50% of the *industrial* activity of the United States has to do with food.

* * * *

It is from average animals, not from champions, that we must make our living.

* * * *

The farm animal that suffers least from anemia is the calf. It is born with a four-month supply of copper and iron in the liver and before it reaches that age it is supplementing its milk diet with feeds containing these elements.

* * * *

Nutrition workers have demonstrated beyond question, that amino acid deficiencies may develop far more rapidly than mineral or vitamin deficiencies. The medical profession shows great interest in increasing the intake of protein in many pathologic conditions.

* * * *

In an experiment at the Larrow research farm, neither flavor nor the odor of the flesh of chickens was affected, when the birds were sprayed with benzene hexachloride (gammexane) or when the roosts were "painted" with this insecticide. Both methods of application were effective in ridding the chicken of lice. It will be recalled that Hixon and Muma (*Vet. Med.* 43:3, p. 90. March 1948) reported the flesh of chickens was rendered inedible for periods up to six weeks, when the birds were sprayed or when kept in a pen or house that had been sprayed with the drug.

Full employment is essential to human happiness; work is Nature's best physician.—GALEN.

* * * *

Seven states have more than 400 frozen food locker plants and in the whole country there are more than 8000 such plants, a survey by the F.A.C. showed.

* * * *

According to Clinton P. Anderson, Secretary USDA, cash receipts from farm marketings in 1947 amounted to nearly 30 billion dollars. This is the highest on record. Farmers' assets in land, buildings, livestock, equipment, and savings also are at an all time high—double the value of these assets in 1940.

* * * *

Howell, an English physician, who lived 500 years ago recommended cod liver oil as a treatment for wounds. Norwegian fishermen as early as 1730 associated the use of cod liver oil with the avoidance of rickets. A hundred years later it was discovered to be rich in iodine and in 1837, was admitted to the British Pharmacopeia.

* * * *

In 1746 Menghinis demonstrated the presence of iron in the blood. In 1830 it was shown that the blood of chlorectic persons was deficient in iron. In 1928 it was shown that in the presence of a small amount of copper inorganic iron is utilized readily in the synthesis of hemoglobin. Thus nearly 200 years elapsed between the discovery of the need for iron in the animal body and the development of an effective method of supplying it.

Federal meat inspection records show 1,400,000 cattle and 60,500 calves livers condemned for fascioliasis in the 11-year period 1933-1943 —more than one million pounds of liver annually.

The technic of medical education is in process of evolution, but certainly the importance of dissection of the human body by the student himself, the technic of animal experimentation as applied to human physiology and experimental surgery, actual practice in the making of laboratory tests and the use of the microscope for the study of pathologic experiments and bacteriologic tests, the presence of a library of recent medical texts and reference works and access to a considerable number of modern medical periodicals are fundamental to good medical education.—*Morris Fishbein.*

Public to Pay Meat Inspectors

Readers will recall that a law, enacted by the 79th Congress, assessed the cost of the federal meat inspection service on the meat packers to whom the service was supplied, beginning July 1, 1947.

Bills have been introduced in both the House of Representatives and the Senate, during the present session of the Congress, providing for payment of meat inspection costs from the U. S. Treasury, as was done from the inauguration of the service in 1890 till last year. The bill introduced by Senator Kem of Missouri (S.2256) was passed by the Senate April 12th. A companion bill introduced by Representative Geo. W. Gillie in the House (H.R. 5675) is, at this writing, yet to be acted upon.

Antianemia Vitamin Discovered

Vitamin B12 is the temporary name given to a new substance, which the discoverers at the research laboratories of Merck and Co., Rahway, N. J., have obtained from liver extract. On initial tests it appears to be from eight to ten thousand times as potent as the extract from which it is made, in the treatment of pernicious anemia.

Vitamin B12 is a pure crystalline compound, which in microgram quantities gives a strong hematopoietic response from a single intramuscular injection. The authors believe it is the active principle or one of the active principles in liver which is responsible for the value of liver extract in the treatment of anemia. When the chemical formula of the new substance is better understood the discoverers suggest that it be given a name indicative of its chemical constitution.

Penicillin: 1,000,000,000,000,000 Units

The production of penicillin in the United States has exceeded one quadrillion units per month during the past year.

Foot-and-Mouth Quarantine Line Pushed South Again

More than 1000 square miles of Mexican territory were released from quarantine during April by moving a sector of the northern quarantine line up to 40 miles south. This is the second advance of the line toward the infected central section of Mexico, since the slaughter plan of handling the disease was discontinued November 26, 1947.

Vaccine produced by the three B.A.I. veterinarians now working in European laboratories was received at the end of April.

Legislation authorizing the U.S.D.A. to conduct foot-and-mouth disease research on a coastal island has been approved by the President and is now in effect. Tentative plans for buildings and facilities have already been prepared.

Prevents Birds from Flying

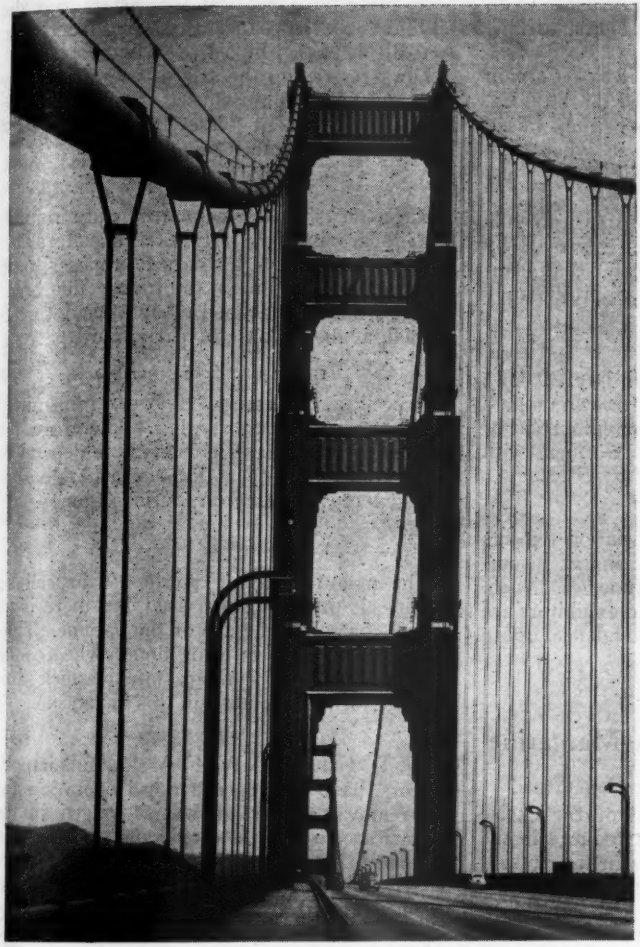
The oldest method of preventing exhibition birds from flying away from the zoo was to clip off the feathers of one wing, so the bird could fly only in a circle. But this made the bird look a bit ragged, and eventually the feathers grew out again and it could fly away.

Pinioning, removal of a section of the large tendon in one wing, was introduced many years ago. However, some of the wings drooped, and often the severed tendon healed and a valuable bird took off for home.

A real wing amputation was developed by the writer in cooperation with the Lincoln Park Zoo, Chicago. It is a surgical amputation of the outer one-third of one wing.

This is done under anesthesia, and the wound is closed immediately. The bird can go on exhibition again almost immediately. As soon as the small feathers grow over the surgical area, the bird presents a perfectly satisfactory picture. But he will never again be able to fly in a straight line, and thus it is easy to keep him within bounds.

The risk from the surgery is extremely small. The bird's suffering is practically nil during the operation, and little, if any during convalescence.—W. A. YOUNG, A.V.M.A. release, August 21, 1947.



Courtesy Union Pacific Railroad

"THE GOLDEN GATE IN '48"

Many superlatives have been applied to the Golden Gate Bridge, seen here from the south (San Francisco) approach, although it is better viewed from the top of Telegraph Hill or some vantage point in Lincoln Park. The towers on the San Francisco and Marin shores are as tall as a 66-story building—744 feet above the water. The bridge deck is 90 feet wide and 220 feet above the surface of the main channel. The greatest ocean liners are dwarfed as they pass beneath it. The center span is 4650 feet long—seven-eighths of a mile—and the suspension unit, 4200 feet, is the longest in the world. The suspension cables are 36 inches in diameter. Between portals the bridge is 8,943 feet, the second longest ever built.

Golden Gate Bridge was completed in 1937. It was built in four years at a cost of $35,000,000; less than one-half of the $77-million cost of the nearby San Francisco-Oakland Bay Bridge, which is more than four miles long including two 2300-foot suspension units and two 1600-foot units.

In addition to attractions afforded by any meeting of the A.V.M.A.—the scientific program, the entertainment features, the renewal of friendships and making new acquaintances —the locale of the 1948 meeting offers far greater attractions than any city in which an annual meeting has been held since 1933 when the convention was held adjacent to the Century of Progress Exposition.

San Francisco might almost be said to be in the business of holding centennial celebrations. The centennial of the discovery of gold in California will be held in 1948; the centennial of the gold rush ('49ers) next year and the centennial of the admission of California to the Union in 1950. In addition to all this celebrating, the normal routine of the city at the Golden Gate is well-nigh a pageant.

The San Francisco Presidio was founded in the Nation's natal year and three weeks later, October 9th, 1776, the *Mission de los Dolores de Nuestro Padre San Francisco de Assisi* was founded. Converted Indians settled about the mission, the seed of the city that was to be. Fifty years drowsed by before a townsite was laid out and then the population of the future metropolis consisted of but a few Indians. In another four years the building of homes began and in 1847 an *alcalde* (mayor) was elected. He at once issued a proclamation changing the name of the settlement on the Bay from *Yerba Buena* (good weed) to San Francisco. The settlement was three-score-and-ten years of age and the population 450. The next year came the gold discovery at Sutter's Mill, and the population jumped to 10,000—"The madhouse of the world." At one time more than 400 ships lay idle in the bay; their

crews having abandoned them and rushed, with all other able-bodied men in the city, to "the diggings."

Two years earlier (July 8, 1846), Captain John B. Montgomery had arrived on the *U. S. S. Portsmouth* and, without opposition, raised the Stars and Stripes on the Plaza, where first the Spanish and then the Mexican flags had flown for 70 unchanging years.

In the first 60 years under American rule San Francisco was seven times destroyed by fire and seven times rebuilt, greater than ever. It now has a population of approximately 800,000.

A patient (*J. Am. Med. Assn.*, Dec. 20, '47) who had been ill of brucellosis for two months and had not been benefitted by streptomycin or by sulfadiazine recovered from treatment with both drugs combined.

The American Medical Association expects a registration of 12,000 physicians at its annual convention in Chicago June 21 to 25. Wives of physicians, visitors and exhibitors are expected to bring the total attendance up to 30,000.

Attempted Repeal of the Margarine Tax

Eighteen bills for the repeal of the excise taxes on oleomargarine were introduced in the House of Representatives early in the present session and referred to the committee on agriculture. The dairy lobby was successful in getting the measures pigeonholed by the committee and funeral services for the bills were held by *Hoard's Dairyman*.

However, by means of a petition signed by a majority of the members of the House, the committee was forced to report one of the bills, H.R. 2245 (Rivers bill), to the House for consideration. This is the first time in 62 years that a bill for repeal of the oleomargarine tax has reached the floor of the House; all previous bills for that purpose having been killed in committee.

When the "oleo bill" reached a vote in the House (April 28), after having been debated for a week, it was passed by the surprising vote of 260 to 106.

To become law the bill must be reported to the Senate by the finance committee, be passed by the Senate and signed by the President. The farm block is relatively more powerful in the Senate than in the House and forecasters give the bill little chance of becoming a law. However, these same political forecasters gave the bill only an even chance of passing the House. Actually it passed by a five to two vote.

Laws restricting the sale of margarine have been enacted in Massachusetts and New York, are pending in New Jersey, and contemplated in Michigan and other states.

Race tracks in Massachusetts paid nine million dollars into the Bay State's coffers last year. Now the state legislature proposes to up the take $1.5 million. Improving the breed seems to improve a good many other interests as well, at the expense of pari-mutuel patrons.

Brucellosis is rarely, if ever, transmitted from one person to another. Therefore the control of the disease in humans is dependent upon eradication or at least measurable suppression of the reservoir of infection in animals.

The manufacture of Strain 19, brucellosis vaccine, is properly supervised, but there is no official control of the use of the vaccine. Thus but one-half a job is being done. The federal authorities are functioning; state livestock sanitary authorities are not—in this instance.

W. D. Gatch and W. F. Mold, Indianapolis doctors, have developed a novel operation for the removal of foreign bodies lodged in the thoracic portion of the esophagus. Through an incision in the gastric wall, suitable forceps are passed into the esophagus and the obstruction grasped and drawn into the stomach. They report this technique is less dangerous and often far less difficult than extraction *via* the mouth.

Oleomargarine

A district court in Montana has held the license fee for the sale of oleomargarine in the state is illegal and has enjoined the Commission of Agriculture from collecting any further fees. The decision will be appealed.

The new tax law on the sale of oleomargarine in Pennsylvania reduces the wholesale license fee from $500 to $2, and the retail license fee from $100 to $2.

A circuit court decision, holding the tax on oleomargarine to be a subsidy for the benefit of the dairy industry and therefore unconstitutional, has been reversed by the South Dakota Supreme Court. The case will be appealed to the federal courts.

Army School of Meat and Dairy Hygiene

The Medical Department School of Meat and Dairy Hygiene at the Chicago Quartermaster Depot offers two courses of instruction: The Meat and Dairy Hygiene Course for veterinary officers and the Meat and Dairy Hygienists' Course for meat and dairy technicians. The Meat and Dairy Hygiene Course was initiated as a six weeks' course late in 1940. On 22 July 1946 (50th class) the course was increased to eight weeks and on 28 July 1947 (56th class) it was increased to 12 weeks. In all, 1909 veterinary officers in grades from first lieutenant to colonel have graduated from the fifty-seven classes.

The Meat and Dairy Hygienists' Course for veterinary enlisted men was started at the Chicago Quartermaster Depot on 3 December 1945, the school having been transferred from William Beaumont General Hospital, El Paso, Texas. The first five classes to receive instruction at the Chicago Quartermaster Depot were of six weeks' duration. On 26 July 1946 the course was extended to eight weeks. It is contemplated that the course of instruction for meat and dairy technicians will be extended to 16 weeks within the next few months. To date, 274 veterinary enlisted men have completed this course satisfactorily in the 13 classes that have graduated since 3 December 1945.

Many new and different types of training aids have been obtained to improve the instruction given in the Medical Department School of Meat and Dairy Hygiene. Full-sized plaster models of beek, pork, veal, and lamb have been made that show the various wholesale cuts. These models are of invaluable assistance in the classroom instruction in these subjects. Chart cabinets have been constructed and placed in each classroom to show advantageously the charts pertaining to the subject under instruction. Other visual training aids, including official and commercial films and slides, have been procured. These aids depict many important phases in the inspection of many food items of animal origin. A film on Army boneless beef has been produced at this school. This film shows in detail the grading of beef carcasses, cutting the meat into primal cuts, and the proper procedure in boning and trimming the individual cuts. The proper methods for packaging and freezing this Army-developed product are included in this film.

A permanent public address system has been installed in each of the classrooms to assist in the instruction. Portable public address systems are used on all field trips and on all demonstrations in food processing plants. A wire recording machine is used to record lectures given by guest speakers and consultants. The lectures given by the regularly assigned instructors are also recorded to permit the officers to study and improve their presentation.

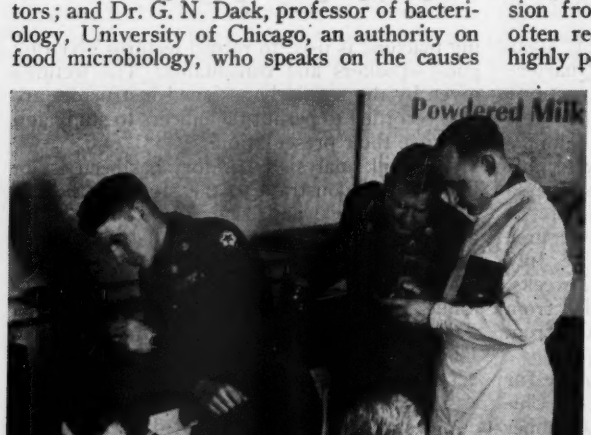
The milk analysis laboratory has been established to demonstrate to the students the numerous chemical and bacteriologic tests which are employed routinely in the analysis of each sample of fluid milk, cream, ice cream, etc. These demonstrations are of immeasurable value in the instruction on milk and other dairy products, emphasizing the importance of laboratory analysis at prescribed and fixed intervals of these dairy products that are so essential to health.

Several field trips are included in each course to permit the student to evaluate the methods employed in the processing and manufacturing of the various foods and food products. In addition, they afford the student an opportunity to observe many of the activities of the veterinary food inspection service. These trips take each class through the sections of the Chicago meat packing plants, fresh milk plants in Chicago and its suburbs, evaporated milk plants, dry milk plants, cheese factories, and poultry processing plants located outside the metropolitan area of Chicago.

Guest speakers who are specialists in their fields are used extensively in the Meat and Dairy Hygiene Course for veterinary officers, to supplement the instruction given by the regularly assigned veterinary staff. This group of speakers who appear before each class includes: George F. Stewart, research professor, Department of Poultry Husbandry, Iowa State College, who speaks on technical phases of the poultry and egg industry; Dr. A. L. Bortree of the School of Veterinary Medicine, Michigan State College, who has given much valuable assistance as a guest lecturer on the methods used in the inspection of dairies and dairy plants and the laboratory analysis of fluid milk products; Dr. W. L. Mallman, professor of bacteriology and public health, Department of Bacteriology and Public Health, School of Veterinary Medicine, Michigan State College, who discusses public health problems pertaining to food inspection and sanitation of establishments; Dr. E. H. Parfitt of the Evaporated Milk Association, Chicago, Illinois, who gives much valuable information on the storing and processing of evaporated milk; Prof. S. T. Coulter, Division of Dairy Husbandry, University of Minnesota, who presents excellent technical and practical information on the

manufacture of butter and ice cream, including those technical points which affect grading factors; and Dr. G. N. Dack, professor of bacteriology, University of Chicago, an authority on food microbiology, who speaks on the causes of food poisoning and methods the veterinary officer can employ to prevent outbreaks of the same. Several specialists from the trade are invited to the school to discuss technical subjects pertaining to products produced in the plants with which they are associated. In addition, veterinary officers who have had experience in the veterinary food inspection activities in overseas theaters are ordered to the school for short periods of temporary duty to familiarize each class with the more important food inspection problems confronting the veterinary officer in overseas theaters.

These two courses given in the Medical Department Meat and Dairy Hygiene School are designed primarily to train the veterinary officer and the veterinary enlisted man for the exacting duties of military veterinary food inspection work. Only those enlisted men who are assigned to the veterinary service are selected to attend this school. In addition, they must possess the prescribed prerequisites. On the completion of the course these enlisted men are assigned to units and serve as assistants to veterinary officers engaged in food inspection work. Many of these men are used for the inspection of foods being processed and prepared in the various types of plants and work independently, receiving only limited supervision from the veterinary officer whose duties often require him to cover a wide area. The highly perishable nature of the products being inspected, the wide range of grades and types of products, their high monetary value, and the many new and far-reaching developments in the food industry are some of the reasons why this school must continue to train veterinary personnel in the best possible technical and practical manner.—*The Bulletin*, U. S. Army Medical Department. 8:4, 1948.



MEAT AND DAIRY HYGIENISTS' CLASS

Lt. Colonel Wm. E. Jennings, V.C., representing the Chief, Veterinary Division, Office of the Surgeon General, returned recently from an inspection trip in the Northwest investigating problems and activities of importance to the veterinary service. On his return from that section he visited the University of Minnesota at Minneapolis, and the University of Wisconsin at Madison, for the purpose of securing information relative to special courses of instruction for veterinary officers in those institutions.

Colonel Jennings also inspected the activities of the Medical Department School of Meat and Dairy Hygiene, Chicago, in connection with the Meat and Dairy Technicians, and the research and development of food inspection and analysis equipment for veterinary use throughout the Army.

The illustration shows Colonel Jennings (at right) inspecting the work of a Meat and Dairy Hygienists' class of veterinary technicians at the Meat and Dairy Hygiene School at Chicago.

Army Veterinary Corps Officers Needed

The Veterinary Corps is working shorthanded. The procurement of Reserve officers for active duty is slower than the loss rate and the shortage of officers will become even more crtical during the next six months when a large group of officers that entered service in 1946 become eligible for separation. However, present world conditions may well stimulate a greater interest in active military service. It is expected that the publication of Department of Army Circular No. 67 on March 15, 1948, which provides for the initial appointment in the Reserve of veterinarians who have had no previous military experience, will result in an increase in the number of applications. Upon

appointment they may apply for immediate active duty. The circular provides that applicants with over one year of professional experience may be appointed in the grade of first lieutenant, with over five years in the grade of captain, and with over ten years in the grade of major, provided they are not over 33, 37, and 45 years of age respectively. Interested individuals may obtain the necessary blank forms for submitting applications for appointment and active duty from any post, camp, station, recruiting office, Army headquarters, The Adjutant General, or The Surgeon General.

Active Duty for Reserve Officers

Any veterinarian now holding a commission in the Veterinary Corps Reserve who had wartime service under an AUS commission may apply for recall to active duty in the grade held by him prior to processing for separation from active duty. Those who served under an AUS commission but who did not accept an appointment in the Reserve at the time of separation may submit an application for appointment to The Adjutant General, using WD AGO For 170 which may be obtained at any Army or Air Force installation.

Those who apply for extended active duty may elect to serve for one, two, or three years by designating Category I, II, or III on the application for extended active duty (WD AGO Form 160).

Course in Meat and Dairy Hygiene Available

Adjutant General letter dated March 9, 1948, announces the availability of quotas for the 59th class of the course in Meat and Dairy Rygiene at Chicago Quartermaster Depot beginning May 10, 1948, and terminating July 30, 1948. Quotas are available in this class for officers of the Veterinary Corps Reserve who are not now on active duty but may apply for active duty for the purpose of pursuing the course of instruction. Any Reserve Veterinary Corps officer interested in taking this course should apply through his Reserve headquarters. The 60th class which will begin in early August will be officially announced at a later date.

Each class comprises about 25 students and the number of Reserve officers that can be accommodated in any particular class will be dependent on the number of active duty officers applying for admission.

Hoffbauer and Spink (Univ. of Minn.) examined liver biopsy specimens of one patient with acute brucellosis and four with chronic brucellosis. All showed extensive histologic changes—granulomatous lesions.

Chief Veterinarian of the U. S. Military Government in Germany Returns to U. S. After Long Absence

Lieutenant Colonel Frank A. Todd of Merrill, Iowa, chief of all Military Government veterinary medicine in the U. S. Zone of Germany, has returned to the United States after seven years of uninterrupted foreign foreign service with the Army.

Colonel Todd, who has served in posts from Reykjavik, Iceland to Berlin, Germany, vacates

Lt. Col. Frank A. Todd

his position as Chief of the Veterinary Section of the Public Health Branch, Office of Military Government for Germany (U.S.) for reassignment in the United States. He also leaves his posts as U.S. Delegate on the Allied Control Authority body and as U. S. representative on veterinary matters to the Bi-partite US/UK Zones of Germany.

For his work overseas, Colonel Todd has been awarded the Legion of Merit, an official letter of commendation from the government of Iceland and praise from the International *Institute des Epizootics* in Paris.

Late in 1941 the United States Government foresaw the need of providing fresh uncontaminated milk to its soldiers in Iceland. Colonel Todd pioneered the veterinary laboratory there and spent two years improving the milk supply, investigating and cobatting diseases prevalent in Icelandic domestic animals.

Attached to the Civil Affairs Division in London as early as 1944 he investigated the policy program for the supply and distribution of veterinary supplies to the war-devastated countries of Western Europe. In working with representatives from Holland, Belgium, France and Denmark statistical records were again kept and measures taken to prevent the spread

of any animal disease by checking the outbreak at its source. During this period he aided in the reestablishment of the International Institute of Epizootics at Paris and followed through until VE day.

As supervisor of veterinary affairs in the U.S. Zone of Germany, since 1945, Colonel Todd has instituted a new program for disease control, revived the system for reporting diseased animals, established training programs for new veterinary officials, and provided instructional courses for German personnel engaged in meat inspection and food hygiene. Recognizing this work, Iowa State College, from which he was graduated in 1933, presented to him the meritorious award as the outstanding alumnus for 1946.

Colonel Todd received his Master of Public Health degree at Yale in 1935. He entered the army in 1935 and was station veterinarian at various army posts until 1941. He has published articles dealing with his military experience in foreign lands in the *J.A.V.M.A.*, the *Military Surgeon* and a recent article "Trichine Inspection in Germany" in *Vet. Med.*

Subsidizing Medical and Veterinary Practice

The advocates of every farmer his own quack always have counties, in which there are no veterinary practitioners, to show as a reason for their program. Usually not much is said about the importance of the livestock industry in these counties that have no veterinarians.

The medical profession has a related problem it has not been able to solve—supplying a medical service for rural areas that now have inadequate medical service, according to American standards. The American Medical Association has long violently opposed state medicine and still opposes it, although its attitude has softened greatly since it was found guilty, by a federal court in the District of Columbia, of violating the anti-trust laws. Currently the A.M.A. is endeavoring to create a public sentiment in opposition to the Murray-Wagner-Dingell public health program. The argument that the medical service is inadequate in many rural areas, is one the medical professions has been unable to refute.

A plan is being tried that may be adaptable in a modified form to veterinary service. It consists in (1) defraying the tuition and part of the expenses of medical students, on condition that, when qualified, they will practice for a specified number of years in districts in which the medical service is inadequate for the needs of the population and (2) being given part time work in the state public health service for which the state will pay up to $1800 a year.

In Kentucky the state medical association raised a fund of $150,000 from which loans will be made to medical students who agree to practice in rural Kentucky counties when graduated. The Indiana State Medical Association awards six $500 scholarships annually to students who agree to practice in counties which the association deems in urgent need of augmented medical service. Alabama's program provides a scholarship of $400 for each of the 67 counties in the state to induce graduates to locate in rural communities. In South Carolina the state provides 14 scholarships ($550) for the same purpose. Mississippi has a $300,000 student state loan fund for the same objective. In Wisconsin the state medical society is sponsoring a bill in the legislature that will, if enacted, provide part time public health work at $1800 per year for physicians who will locate for practice in specified rural communities.

The Wisconsin plan is not new to veterinary medicine. In continental European countries all, or nearly all, veterinary practitioners have certain official duties in their local communities for which they are paid by the government. Government employment of veterinarians on a whole or part time basis is nearly universal in the Latin-American republics. Recently certain provinces of the Dominion of Canada have adopted a subsidy plan for veterinarians who will undertake general practice in districts where there is inadequate veterinary service available to the livestock raisers. The plan provides an annual stipend of $2000. The veterinarian on his part waives milage charges on his calls; the cost of veterinary service thus being equalized for all livestock owners. Some states in this country, notably Montana and Maryland have long followed a practice of allotting state work on a *per diem* basis to veterinarians willing to locate for practice in districts in need of an animal health service. The plan has worked well and could be adopted with advantage by other states, that have areas without veterinary service. By this means the official state veterinary service is improved, because matters are handled more promptly and by a man familiar with local conditions, and the cost is lessened because of the saving in transportation and hotel expense. Aside from the routine state work, such as inspection for interstate shipment, supervision of sanitation and disease control regulations at community sales, direction of rabies quarantines, tuberculosis and brucellosis testing, emergency work etc., at the present time the value to the state of having a guard in every district alerted for the detection of foot-and-mouth disease may be incalculable. In any case it would be a safety measure most welcome to the livestock industry

Illinois' Veterinary College to Open Next Fall

The University of Illinois, College of Veterinary Medicine will be activated next fall with acceptance of a small freshman class. Preveterinary students were accepted at the University in 1945, graduate students in 1947.

Until funds are available for construction of permanent buildings to house the college, a former student residence structure will be used for offices and laboratories to accommodate the freshman group. The former veterinary pathology laboratory also is being remodeled for teaching purposes. Only small classes can be accepted until the new buildings are completed, Dean Graham has stated.

The College of Veterinary Medicine was established by the University of Illinois Board

M. E. Mansfield

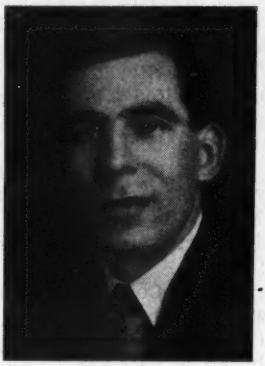
of Trustees in June 1944, and building funds were appropriated by the state legislature in 1945 after curriculum and building needs had been determined by a special committee.

Shortages of building materials and labor made construction inadvisable at that time. Further delays have resulted from increased construction costs and the fact that the original appropriation is now insufficient to complete the college's building project.

Dean Robert Graham, University of Illinois, College of Veterinary Medicine, announces the appointment of two new members of the faculty—Dr. M. E. Mansfield and Dr. W. Alastair Grieg.

Dr. M. E. Mansfield, formerly a practitioner at Rockwell City, Iowa, has been appointed assistant professor of veterinary extension, University of Illinois, College of Veterinary Medicine. He will assist Dr. E. A. Woelffer of the veterinary college staff in developing the veterinary extension program; specializing in swine, beef cattle and poultry diseases.

Doctor Mansfield received both his B.S. and his D.V.M. at Kansas State College in 1945,



W. A. Greig

and has been engaged in private practice in Rockwell City since graduation.

W. Alastair Greig, B.S., M.R.C.V.S., Edinburgh, Scotland, has joined the University of Illinois, College of Veterinary Medicine staff as visiting assistant in the department of veterinary clinical medicine.

Major Greig was graduated from the Royal (Dick) Veterinary College, Edinburgh, in 1942. He received the bachelor of science degree in veterinary science from the University of Edinburgh in the same year.

During the war, Major Greig spent three years in India as a member of the Royal Army Veterinary Corps. He was discharged early in 1947 with the rank of major. Since then he has been engaged in general practice and in revising a standard British handbook for veterinarians. He is a member of the National Veterinary Medical Association of Great Britain and Ireland, and of the Highland and Agricultural Society of Scotland. He is a son of Dr. J. Russell Greig, Director of the Moredun Research Institute, but known in this country chiefly for his work on parturient paresis and for the development of the calcium gluconate treatment for that ailment.

Major Greig is not the first from his Alma Mater to come to the University of Illinois. F. W. Prentice, M.R.C.V.S., who was graduated from the Royal (Dick) Veterinary College in 1869, was the first head of the Veterinary Department of the U. of I., then the Illinois Industrial University. It was the inspiring teaching of Prentice, that, in 1876, influenced W. L. Williams, then a student of the U. of I., to forsake farming and embark on a veterinary career. Prentice remained with the University from 1873 to 1885 and resigned to enter medical practice in the Northwest.

VETERINARY SCHOOLS IN THE UNITED KINGDOM

The course of training in veterinary medicine in Britain lasts five years, and leads to the diploma of the Royal College of Veterinary Surgeons (M.R.C.V.S.). The Royal College of Veterinary Surgeons, 10, Red Lion Square, London, W.C.1, is not a teaching college, but a governing, examining and licensing body of the profession in Britain, and no one may practice veterinary medicine or surgery unless he holds the M.R.C.V.S.

Four schools which offer courses qualifying for the M.R.C.V.S.:

1. The Royal Veterinary College and Hospital, Camden Town, London, N.W.1.
2. The Royal (Dick) Veterinary College, Summerhall, Edinburgh 9, Scotland.
3. The Glasgow Veterinary College, 83 Buccleuch Street, Glasgow, C.3, Scotland.
4. The Veterinary School of the University of Liverpool, Liverpool, Lancashire, England.

Degrees

Students at the Royal Veterinary College, London, and the Royal (Dick) Veterinary College, Edinburgh, are eligible to take the examinations for the degree of B.Sc. in Veterinary Science of the University of London and Edinburgh, respectively, as internal candidates. Students of the Liverpool School of Veterinary Science may take the examinations for the degree of B.V.Sc. as internal students of the University of Liverpool. Students at the Glasgow Veterinary College may take the examinations for the degree of B.Sc. in Veterinary Science of the University of London as external students.

The course of training for these degrees runs concurrently with the course for the diploma of M.R.C.V.S., but an extra year may be required to complete the course.

Entrance Requirements

The intending student should first apply to the Secretary, The Royal College of Veterinary Surgeons, 10 Red Lion Square, London, W.C.1, for registration as a veterinary student, before he can commence his studies. It is required that he should have passed the matriculation examination, or some equivalent examination that entitles him to admission to a British university. Separate application to one of the recognized schools must be made direct to the school authorities.

M.R.C.V.S.—Examination Requirements

The subjects for examination for each of the five years of the course are:

First Year: Chemistry; physics; biology (botany and zoology).

Second Year: Physiology; biochemistry; histology; embryology and animal management.

Third Year: Anatomy of domesticated animals; pharmacology and therapeutics; toxicology; practical pharmacy; veterinary hygiene; dietetics and animal husbandry.

Fourth Year: Veterinary pathology; methods of clinical pathology; veterinary parasitology.

Fifth Year: The principles and practice of veterinary medicine (including special therapeutics, meat inspection, and jurisprudence); the principles and practice of veterinary surgery (including surgical and applied anatomy, operative surgery, obstetrics, and jurisprudence).

It is also necessary for a student to have at least six months' practical work with an approved instructor, but this is usually arranged for during vacations, and thus is not additional to the course.

Cost of Training

The total approximate cost of training for the diploma course is £300 ($1,200), and for the combined diploma and degree course £320 ($1,280), but the cost at some of the schools is lower. This does not cover living expenses.

Scholarships

Very few scholarships are available to overseas students for study at British veterinary schools. Application for them should be made to the schools direct.

Graduate Work

Details of the post-graduate diplomas may be obtained from the Royal College of Veterinary Surgeons, 10 Red Lion Square, London, W.C.1.

Graduates in the United States

The Royal Veterinary College (London), first veterinary college in Britain, was initiated in 1791 by a Frenchman, Charles Vial, a graduate of the veterinary school at Lyon, France. As the opening of the London school preceded the founding of the first veterinary college in Canada by 71 years and the first "viable" school in the United States by 84 years, it followed that graduates of this school who emigrated to North America and, even more, Americans who attended the London school and returned to this country to practice, were leaders in the early development of veterinary medicine in the United States and Canada.

The first veterinary graduate of record to establish a practice in the United States was John Haslam, who came to Baltimore in 1801.

There followed J. Clements (New York, 1804), James Carver (Philadelphia, 1815), Wm. Wallis (Charleston, S. C., 1818), C. C. Grice (New York, 1826), John Scott (Philadelphia, 1828), R. H. Haslam (Baltimore, 1829), B. T. Simpson (San Francisco, 1835), W. H. Lilyman (Boston, 1840), C. Pilgrim (New York, 1843), and Henry Corby who came to St. Louis in 1859. All were graduates of the London school.

About the middle of the 19th century, graduates of the Royal (Dick) Veterinary College, Edinburg, Scotland, and the Glasgow Veterinary College began to emigrate to North America. This group, which was large, included a number of men of outstanding ability, who established veterinary education on this continent and influenced the course of veterinary medicine profoundly, till the first decade of the 20th century.

Statue of Wm. Dick in the grounds of the Royal (Dick) Veterinary College in Edinburgh. Professor Dick, son of a blacksmith, founded the veterinary college in Clyde Street in 1823, where it remained for 100 years. In 1923 it was moved to the present site near the world-famous University of Edinburgh with which it is affiliated. Professor Wm. M. Mitchell, the dean of this school will visit the U. S. during July and August and attend the San Francisco meeting of the A.V.M.A.

Andrew Smith (Dick) founded the Ontario Veterinary College, McEachran (Dick) the Montreal Veterinary College, Lyman and Osgood (New Edinburgh) the Harvard Veterinary College, Law (Dick) the New York State Veterinary College at Cornell University and Hughes (Glasgow) the Chicago Veterinary College.

At the same time Prentice (Dick) in Illinois and Dalrymple (Glasgow) in the University of Louisiana were setting the pattern for veterinary departments in agricultural colleges and state experiment stations; Samuel Going, who eradicated glanders from an important army post in 1875, and his brother William were demonstrating the value of educated veterinarians to the army; Laughlin McLean was inaugurating a federal service that later became the Federal Bureau of Animal Industry, and Drysdale and McIntosh (the first to come to the U. S. from the Edinburgh school) and many who followed them, were setting standards in veterinary practice. Until well into the 1890's many text-books by British authors were used in our schools. By 1900 most of them had been supplanted by translated German texts.

The Purpose of Schooling

The great end of education is to discipline rather than furnish the mind; to train it to use its own powers, rather than fill it with the accumulation of others.—*Tyron Edwards.*

Geoponics and Veterinary Science

Food is headline news in most parts of the world today. American scientists are in many lands trying to teach the inhabitants methods that will increase food production. They have many experiences for which they were unprepared.

Six agricultural experts are in Siam, to introduce new high-yielding strains of rice and improved cultural methods; also to teach methods of storage and distribution that will save the 10% of the annual production that is now bestroyed by insects fungi and rats.

Imagine their surprise to learn that all their efforts would come to naught, if there were no water buffalo to cultivate the soil; the work animals couldn't be maintained except rinderpest was controlled, and rinderpest couldn't be ocntrolled without a veterinary service.

Here were six agricultural experts, who had reached eminence in their line without ever having to take animal disease into account. An efficient smooth working veterinary service, of which they were probably only vaguely aware, had solved for them one of the most fundamental problems of husbandry. Cast upon their own without that service their efforts were completely futile.

Dr. A. J. Carlson Cites the Value of Animal Experimentation

"A highlight of the annual meeting of the Illinois State Veterinary Medical Association at Peoria, Illinois, on January 28, 29, 30 was a stirring talk by Dr. A. J. Carlson, Professor Emeritus of Physiology at the University of Chicago. Dr. Carlson pointed out that we cannot apply the known nor probe the unknown in the biological and medical sciences without recourse to experiments on animals. There could be no polio cure, no blue baby operations without repeated experiments and medical checks on animals. More than fifty drugs, beneficial in the treatment of human diseases must be constantly checked with laboratory animals.

"Who are the antivivisectionists and how do they get that way? There are a few individuals who find it expedient to keep the myth of cruelty and futility of animal eperimentation perpetuated. Some of these people make a very good living from their activities. Others are flattered by the publicity that accompanies their maneuvers and are recompensed in that way.

"In all humility it must be admitted that quacks, the dumb, and the blind of our professional people in the medical sciences are included in the antivivisection ranks. But the largest segment is made up of average, normal citizens, lovers of cats and dogs, but pitiably ignorant of modern medicine and biology, and misled by the perpetual propaganda that animal experimentation is performed with sadistic incompetence.

"It is our duty as doctors to enlighten the layman on the humane nature of animal experimentation, pointing out that it is necessary to study the living in order to understand and protect the living. It is urged that closer cooperation between doctors who treat animals and doctors who treat humans be extended and that a more vigorous public information program be instituted. Biological sciences and medical sciences are one."—*Peoria* (Ill.) *Journal.*

Following the address by Doctor Carlson the Association adopted the following resolution without a dissenting vote.

1. Whereas, the Illinois State Veterinary Medical Association was founded upon a desire of its members to improve its methods of controlling diseases of our livestock and safeguard the public health from diseases of animals communicable to man; and

2. Whereas, the depredations of homeless and unwanted dogs cost the owners of livestock approximately $250,000 in 1946 in Illinois, and caused about 5000 people to take the Pasteur treatment for rabies; and

3. Whereas, advance in veterinary science is not due to chance, but in the main is dependent upon scientific research, which at one or more stages involves intelligent animal experimentation on a large scale; and

4. Whereas, research in the medical sciences is at best inadequately supported by public funds, and should not be limited by unnecessary expenditure for experimental animals,

Therefore, Be It Resolved: that the Illinois State Veterinary Medical Association approve and support the following principles and policies:

1. Public welfare demands that research in the medical sciences be continued and extended.

2. Advance in knowledge in the medical sciences would be severely handicapped without the use of animals.

3. The use of animals for the standardization and testing of drugs and biologicals is indispensable.

4. All animals in city or other dog pounds, which are unclaimed and to be killed, shall be made available to scientific research laboratories approved for that purpose by the State Department of Agriculture or by the State Department of Health, and to teaching institutions approved for that purpose by the State Department of Education.

What Do Vitamins Do?

Functions of Vitamin A

Promotes growth, health, appetite, digestion, vitality and livability.

Aids in tissue formation.

Acts as a regulating substance.

Helps prevent infections, notably of the eyes, sinuses, air passages, and lungs.

Increases resistance to some parasites and many infectious diseases.

Necessary for good fertility and hatchability.

Strengthens tissue and membrane formations.

Maintains a normal functioning of epithelial and nerve tissues.

Necessary for egg production.

Aids in giving good tone and balance to the nervous system.

Prevents nutritional roup in poultry.

Functions of the D Vitamins

Control calcium and phosphorus equilibrium.

Regulate mineral metabolism.

They are specific against rickets.

Aid in muscle and tissue building.

Promote growth and health.

Essential for vitality and livability.

Also essential for egg production and hatchability.

Functions of Riboflavin

Essential for growth, health and body maintenance.

Necessary for normal nutrition, good feed utilization and the constant production of normal blood.

Needed for the prevention of curled-toe paralysis and dermatitis in turkeys.—*Vitamineral News.*

Watch Your 1948 Income Tax Estimate

By HAROLD J. ASHE
Tax Counselor

TAXPAYERS finally are about to enjoy substantial tax relief, following passage of the new income tax law which is retroactive to January 1, 1948. Effect of tax savings should be felt by individual taxpayers as early as June 15, the date for making the second quarterly payment on their 1948 income tax estimates, provided they file a new "declaration of estimated tax" at the time of making the second payment.

The essential characteristics of the new tax law are:

1. Increases personal exemptions by $100, *i. e.*, from $500 to $600 each. Thus, a taxpayer with five exemptions including himself gains another $500 in exemptions, or the equivalent of another dependent under the old law.

2. Makes the "community property" principle applicable to all states in the nation, putting 36 states on a parity with the original 12 which enjoyed this tax splitting advantage. Husbands and wives in all states may now divide family income equally for tax reporting purposes. This frequently places the total taxable income in lower tax brackets than otherwise. This is a tax advantage wherever family income (after exemptions and deductions) totals more than $2,000. In higher brackets the saving is substantial. It also permits income over $5,000, but less than $10,000 to be reported on the short form where income is split between huband and wife.

2. Additional percentage cuts on tax rates have been made. For purposes of determining these percentage cuts, the old law rates are used in making the preliminary calculations. Thus there is:

(a) 12.6% off the tax on the first $2,000 of income (after deductions and exemptions).

(b) 7.4% off on that part of the tax computed on income above $2,000 and up to $136,700.

(c) 5% off the tax on that part of income above $136,700.

The above percentage cuts are in addition to the 5% cut allowed Jan. 1, 1946, on the old law rates.

4. An additional $600 exemption for taxpayers 65 years of age (or who become that age before year-end) or older, making the total exemption for such taxpayers $1,200. This applies to either the taxpayer or spouse, or both, but not to other dependents, such as a dependent parent.

5. Taxpayers who are blind according to certain optical definitions, or who become blind prior to year-end, are given an additional $600 exemption, regardless of age. This, too, applies only to the taxpayer or spouse, or both, and not to other dependents, such as a son.

6. Continues the 10% income deduction for deductible items, such as medical, other taxes, interest, contributions, etc., if not itemized. However, the maximum deduction without the need to itemize is increased from $500 to $1,000.

7. Applies the community property principle to estate and gift taxes.

The complexity of the tax cuts, increased exemptions and deductions in the new tax law, make it imperative that taxpayers scrutinize 1948 income tax estimates most carefully, and revise them upward or downward as circumstances dictate. This should be done by June 15 deadline for second quarterly installment on 1948 tax if taxpayers wish to benefit immediately from the tax reduction law.

Recently this writer has run into several instances in which taxpayers have been sharply over-paying on quarterly installments while, at the same time, they have been obliged to pass up attractive discounts for lack of ready cash, seek bank loans to carry them over slack periods. In short, these businessmen unwittingly have bee nlending to their government —*and without interest*—funds they can ill-afford to part with, even temporarily.

In previous years many taxpayers have not been greatly concerned about over-payment on estimates because of having more funds than they could profitably use in business or invest, and frequently looked upon tax refunds after March 15 as a sort of windfall. Now this casual attitude is due for critical examination by dollar-short taxpayers.

With mounting costs, with more funds necessary to conduct business, taxpayers must become more tax conscious year around. 1948 may very well be *the* year when a minimum number of original income tax estimates get out of line and require scaling down sharply as the year unfolds.

Here are the three important factors that can throw the tax estimate way off:

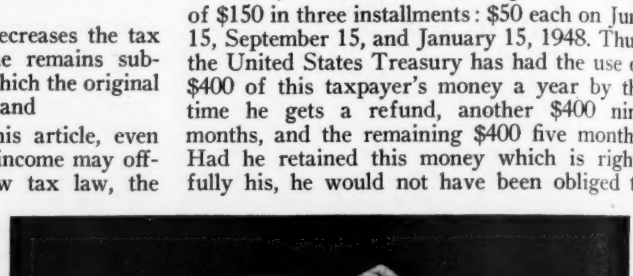
1. Net income from business is likely to be

more unpredictable than any immediate past year. Even though the early months of 1948 may closely parallel the same months of 1947, it will be unwise to assume that the entire year will compare favorably with 1947, even though such comparison has proved valuable in past years.

2. The tax reduction law decreases the tax even if the taxpayer's income remains substantially the same as that on which the original estimate for the year is based; and

3. As discussed later in this article, even though an increase in taxable income may offset the savings from the new tax law, the estimate may still be off because of other factors usually overlooked until filing of the income tax return after year-end.

So, with the above in mind taxpayers, as never before, would be well advised to review net earnings immediately prior to each quarterly tax installment, and be prepared to file an amended declaration of estimated tax, and adjust the estimate downward, immediately reducing quarterly payments, if the facts warrant. This is merely the reverse procedure on increasing the estimate where taxable income materially increases. Amending the estimate upward is mandatory. Amending it downward is optional, but should be more generally done than is now the case.



Take a typical case within this writer's personal observation. A taxpayer who, in 1945 and 1946, reported a net income of around $13,000 each year from his business, a farm, and interest on mortgages, went ahead on March 15, 1947, and filed a declaration of estimated tax based on 1946 income in the belief his income would be substantially the same in 1947.

Meantime, operating costs in his business mounted. In the fall a partial crop failure took him into the red on his farm venture. Only his interest on mortgages remained steady. By June he knew what the business trend was, but he still hoped for a revival to offset the slow start. It didn't materialize!

So, each quarter he went right on paying $450 on an estimated $1,800 tax. By year-end his net income barely touched $5,000 and, after all deductions and exemptions, his tax was around $600. This meant, of course, that following the filing of his 1947 income tax return he will get a refund of around $1,200—probably in June or July, 1948.

Had he adjusted his estimate on June 15 to $600, having paid $450 on the March 15 installment, he then would have paid a balance of $150 in three installments: $50 each on June 15, September 15, and January 15, 1948. Thus, the United States Treasury has had the use of $400 of this taxpayer's money a year by the time he gets a refund, another $400 nine months, and the remaining $400 five months. Had he retained this money which is rightfully his, he would not have been obliged to dispose of one mortgage at a discount last December to get working capital for his business. And the government had the use of his funds interest free!

As soon as the taxpayer sees that his income for the year is running substantially less than he believed would be the case, or that his tax will be less because of reduced rates, he should file an amended declaration accompanying his next quarterly payment. The same form, 1040ES, must be used, preceding the head on that form with the word "amended" immediately before the word "declaration."

On line 5 of the declaration, show the amount of the payment or payments made on the original declaration, and subtract this from the new estimate, dividing the balance due by the number of remaining payments, if more than one. Additional amendments may be made each quarter if necessary, or the first amended

estimate may be made as late as the due date of the final installment.

If, subsequent to making the original estimate, the taxpayer assumes the support of an additional dependent, he may be warranted in cutting down the estimate by the amount of the tax saving such dependent represents and provided, of course, such dependent qualifies as a dependent within the meaning of the tax code. A child born as late as one minute of midnight December 31, 1948 (and certainly not anticipated on March 15, 1948) would entitle the parent to a tax exemption of $600, a tax saving of at least $99.64 based on the new tax rate. (20% of $600, less 5%, less 12.6%).

In addition, personal deductions not anticipated at the time of filing the original estimate should be watched closely as the year progresses. These might include excessive medical bills, deductible losses, casualties, interest, taxes or other deductible items not foreseen at the time of making the original estimate, but subsequently incurred or sustained in the tax year.

Because of the complexity of the tax reduction law, herewith is a step-by-step formula to use in recomputing your 1948 income tax estimate for filing an amended estimate:

1. Estimate your total income, including that of your wife, if any.

2. Estimate the amount of your deductions for medical, interest, taxes, contributions, etc., or if less than 10% of Item 1, take 10% of Item 1 up to a maximum of $1,000.

3. Now subtract your deductions (Item 2) from your total income (Item 1).

4. Next total your exemptions, including yourself, wife, and others dependent upon you for more than half of their support, at $600 for each dependent.

5. Subtract the total of these exemptions (Item 4) from Item 3. This, now is your taxable income.

6. If you are married, divide the amount of the taxable income (Item 5) equally between husband and wife.

7. Using the old tax rates in effect prior to the tax reduction, compute your income tax on Item 6. (Or, if not married, on Item 5.)

8. Deduct from Item 7 the sum total of the following:

(a) 17% of the first $400 in Item 7;

(b) 12% of the amount in Item 7 in excess of $400, but not in excess of $100,000;

(c) 9.75% of the amount in Item 7 in excess of $100,000.

(Note that the 17, 12 and 9.75% is a reconciling of the combined 5% cut allowed Jan. 1, 1946, and the new cuts of 12.6, 7.4 and 5%).

9. After subtracting the sum total of Item 8 from Item 7, the taxpayer now has his total income tax, if unmarried. If married and he has, in using this formula, already divided his income between himself and his wife, he must now finally—

10. Double the mount of Item 9. This is his total tax for combined family income. This is the figure he should now enter in his Amended Declaration of Estimated Tax on Line 1 of that form or, if unmarried, the amount shown in Item 9.

To illustrate how this works out, assume that a taxpayer is married, has two dependent children, and his wife is blind. He estimates his personal deductions will total $1,000. He has four regular $600 exemptions, plus a $600 blind exemption. His income is estimated at $9,000. Here are the steps taken in computing the amended estimate:

(1)		$9,000.
(2)	Less	1,000 for personal deductions
(3)		$8,000
(4)	Less	3,000 for exemptions, including $600 blind exemption
(5)		$5,000
(6)	Divide	2,500 each for husband and wife
(7)		$510 old rate tax on $2,500
(8) (a)	$68.00	
(b)	13.20	
(c)	None	
Total		$ 81.20 tax rate cut
(9)		$428.20
(10)		2 multiply
		$857.60 combined tax of husband and wife

The tax at the old rate would have been $1360.

Science is the product of human curiosity.

* * * *

Parasites: Chicks that chirp but do not scratch.

* * * *

Where all think alike no one thinks much. —*Walter Lipman.*

* * * *

Distinguish between the trickery of words and the reality of things.—St. Augustine.

* * * *

Rats avoid class hatred, race conflicts, talking politics, citing statistics and reading papers on psychology.

* * * *

Blessed is the man who having nothing to say, abstains from giving wordy evidence of it.—*George Elliott.*

Immunology and Epidemiology of Virus Diseases*

By M. CRAWFORD, M.R.C.V.S.
Weybridge, England

AN infectious disease is essentially a manifestation of a host-parasite relationship and such a relationship is not a static condition but one capable of continual change. Theoretically the ideal relationship is an equilibrium or symbiosis; when the parasite and its host have attained a state of perfect equilibrium disease is not manifested, the host is infected by the parasite without any apparent ill-effect being produced. Where disease results from the infection the adaptation of one to the other has not yet attained perfection. The state of adaptation will obviously vary with the length of time during which the parasite has been associated with any particular host, and the effect produced by a parasite when it attacks a new host may be very different from that produced in its true or definite host.

The successful parasite must have perfected some means of penetration into its host. Having done so, it must be able to reach the particular tissues which are favorable to its development and it must also have some means whereby it can pass from one host to another. The reactions of the host vary; it may endeavor to prevent the parasite from penetrating, to destroy it after penetration, or, if unable to destroy it, to neutralize any ill-effects which it may cause.

In these activities both the parasite and the host are influenced by the environmental conditions in which both live.

In this consideration of one or two of the many aspects of immunity and epidemiology of certain virus diseases, I shall endeavor to look upon the diseases not only with the eye of the pathologist or the clinician, but also with that of the biologist when he studies a host-parasite relationship.

In doing so, I know that I am begging the question as to whether the viruses are actually living parasites or not. I am not going to attempt to discuss that most intriguing and difficult question. I shall content myself by saying that in their power of multiplying, in their nutritional requirements and their reactions to heat and to disinfecting agents, the viruses possess sufficient of the attributes of living parasites to justify their being considered as such in the present state of our knowledge. I shall consider them as resembling very closely minute bacteria from which they differ chiefly by their smaller size and by the important feature that, so far as we know, they are compulsory intra-cellular parasites which cannot multiply in a cell-free medium.

Immunity

To come now to immunity against virus diseases: A feature of many virus diseases is the solid and lasting immunity which is developed by the host as a result of natural infection. That is not true of all virus infections but it is a feature of many. Influenza and the common cold are examples in which immunity is not durable. Until recently herpes in man would have been cited as an example of a disease from which the host could suffer repeated attacks without developing immunity, but the work of Burnet in Australia has upset that conception. His work indicates that the herpes virus once it has gained entrance to the human body persists in certain tissues throughout the life of the host. After the primary attack, which generally occurs in infancy, it lies dormant but capable of becoming active again at any time when the resistance of the host is lowered either by intercurrent infection or by other adverse conditions. To the biologist herpes would be an example of an almost perfect host-parasite adaptation. Other examples of such persistent latent infections have been demonstrated in various laboratory animals and it is quite probable that they may exist in domestic animals.

Marked differences in resistance to infection by different breeds of the same species are a feature of some virus diseases, a notable example being rinderpest in cattle. The resistant breeds appear to have been developed as a result of long exposure to the virus. British breeds of cattle, for example, have little or no resistance and the mortality when they are infected is very high, generally in the nature of 80% to 90%. The cattle of the plains of India are much more resistant and mortality may be as low as 25% to 30%.

Many methods are used for artificial immunization against virus diseases including passive immunization by the use of hyperimmune serum; simultaneous inoculation with serum and virus; the use of virus which has been inactivated by the action of agents such as formalin, crystal violet, phenol, chloroform, or by exposure to ultra violet light, and the oldest method of all, namely, the use of virus modified by animal passage.

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Heat-killed vaccines which are so commonly used in immunization against bacterial diseases have not proved of any value against virus diseases.

I shall now discuss the use of virus modified by passage through an unusual host.

Jenner's method of vaccination against smallpox is the classical example and Pasteur's rabies vaccine is also based on it. It, therefore, has the longest history of any of the methods of immunization. It is curious that in spite of this long history and its established success in smallpox and rabies, it is only within comparatively recent years that it has been utilized in other diseases. It is of interest to note that this method is used only in diseases caused by viruses. None of the vaccines in use for immunization against bacterial diseases is made by this method.

The basis of the method is the artificial adaptation of a virus to an unusual host, this being brought about by repeated passage from host to host. Examples in use today are the goat-adapted rinderpest virus, the mouse-adapted horse sickness virus, the egg-adapted avian pneumoencephalitis virus, the ferret-adapted distemper virus and the egg-adapted rinderpest virus. This process of artificial adaptation of a virus to a new host is full of interest and a closer examination of one of these "adapted viruses," namely, the goat-adapted rinderpest virus, may prove of interest.

It was Edwards at Muktesar who developed this method as a practical means of control of rinderpest. When he started work the method in general use for the immunization of cattle against this disease was the simultaneous inoculation of immune serum and virulent virus. The source of virus was blood from an infected ox. A serious drawback to the method was that the blood might, and often did, contain pathogenic protozoan organisms such as species of Babesia, in addition to the rinderpest virus. In such cases heavy losses were likely to occur in the inoculated cattle. To obviate this danger, Edwards conceived the idea of utilizing the goat instead of the ox as a virus producer. The protozoan blood parasites of the goat do not infect the ox so goat's blood would be a much safer source of virus. His choice of the goat was probably influenced to some extent by the knowledge that the goat was known to be susceptible to infection with rinderpest. Natural outbreaks of rinderpest in goats were of rare occurrence but had been recorded. When Edwards attempted to transmit rinderpest to the goat from cattle by inoculation of blood, he found it was difficult to do so with any certainty. In his first attempts the infection, when it succeeded at all, was so mild as to be almost inapparent, little more than a short rise of temperature. With repeated passages, it became possible to infect with certainty and to produce a disease of considerable severity in the goat. Having reached this stage, he used goat blood to replace ox blood as a source of virus for serum-simultaneous inoculations. Later, after the virus had been passaged through goats for many generations, it was found that the goat virus without a protecting dose of serum, could be injected safely into cattle of certain breeds which had a considerable degree of natural resistance to rinderpest. In such cattle, the goat-passaged virus produced a very mild attack of rinderpest, with little or no mortality, which was followed by a strong and lasting immunity. Edwards then advocated the use of goat-adapted virus, without a protective dose of serum, as a practical method of immunization of cattle of such Indian breeds as were known to have a considerable degree of natural resistance to the disease. He did not advocate its use in cattle of highly susceptible breeds because of severe reaction and often fatal termination.

The method soon became popular in India and today has largely replaced other methods except where cattle or buffaloes of the more susceptible breeds are concerned.

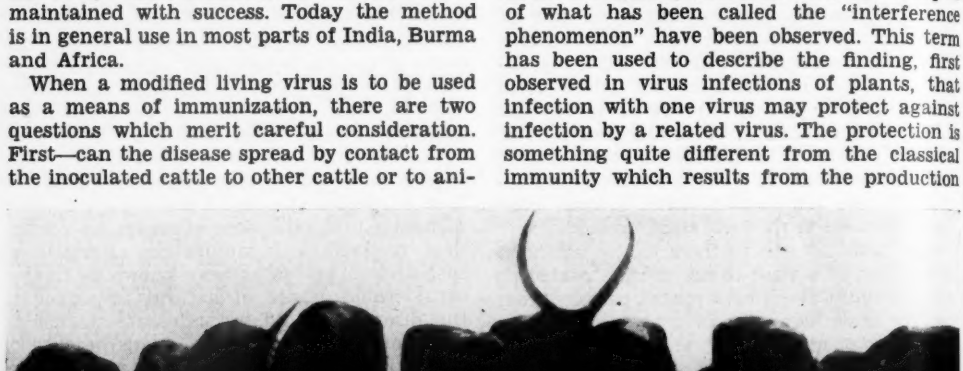
The Indian results attracted Daubney's attention in Kenya and he obtained a supply of Edwards' goat-adapted virus. When it was used on Kenya cattle, the reactions were so severe and the mortality so considerable that it could not be used without a controlling dose of serum. The explanation seems to be that Kenya cattle are more susceptible than the Indian cattle. Daubney therefore attempted to produce his own strain of modified virus. He started with strains of virus from natural outbreaks of rinderpest in Kenya cattle and succeeded in adapting several of these to the goat. One of his strains, now generally known as Kabete Goat Virus, proved after many generations of goat passage to be sufficiently attenuated for use on the Kenya native cattle but was still too virulent for use on highly susceptible cattle of European breeds. Even today after many hundred generations of passage in goats, I understand that the Kabete Goat Virus is still too virulent for European cattle. Following Daubney's work in Kenya his strain of goat virus was introduced into other African territories such as Tanganyika, Uganda and Nigeria. A very curious feature of the history of the development of this method of immunization is that in most cases when first introduced into a new territory, very severe reactions with considerable mortality followed its use. This was the case in Nigeria just as had been the case when Ed-

wards' virus was introduced into Kenya. In Nigeria it was only after a considerable number of passages in Nigerian goats that the virus became sufficiently mild to be used with safety for immunization of Nigerian cattle. It was also found in Nigeria that a certain breed of native goat was quite unsuitable for maintaining the virus. In these goats the virus died out, while in another breed it could be maintained with success. Today the method is in general use in most parts of India, Burma and Africa.

When a modified living virus is to be used as a means of immunization, there are two questions which merit careful consideration. First—can the disease spread by contact from the inoculated cattle to other cattle or to animals of other species? And, secondly—is it possible for the modified virus to undergo a reverse process, as it were, and to regain its former virulence? In the particular case of the goat-adapted rinderpest virus, the virulence has been attenuated for cattle by passing it through goats, but by so doing its virulence for the goat has been exalted. It would, therefore, appear likely that the widespread use of such a strain of virus in cattle would involve the risk of infection spreading to goats, unless precautions were taken to prevent healthy goats coming into contact with cattle reacting to inoculation with the virus.

The first point which has to be settled is—can the reacting cattle pass on infection to other cattle, to buffaloes, to goats or to species of game which are susceptible to rinderpest?

On the question of transmission by contact to other cattle, the great majority of observers appears to be satisfied that this does not occur in the field. Millions of cattle have been immunized by this virus in India and in Africa without any precautions being taken to segregate the inoculated cattle while they are reacting. One is justified in assuming that, had infection by contact been a common occurrence, instead of the few there would be many examples recorded in the literature.



The Kabete goat virus is too virulent for European cattle but is used for native cattle in Uganda and other parts of Africa.

The Interference Phenomenon

In the study of immunization by means of these zoologically modified viruses, examples of what has been called the "interference phenomenon" have been observed. This term has been used to describe the finding, first observed in virus infections of plants, that infection with one virus may protect against infection by a related virus. The protection is something quite different from the classical immunity which results from the production of antibodies. In the classical type of immunity the injection of an antigen excites the production of antibodies which can be demonstrated in the blood. A time interval, generally related to the incubation period of the disease, is required before the antibodies are produced. The interference phenomenon is not dependent upon the development of antibodies. Two viruses, one of low virulence and the other highly virulent, can be injected simultaneously with the result, in some cases, that the virulent virus does not cause disease. Many examples have been recorded in laboratory experiments. Pfaff (1939) recorded that cattle which had been inoculated with goat-adapted rinderpest virus could resist infection with fully virulent cattle virus injected as early as 24 to 48 hours after the goat virus. Green in America claims that injection of dogs with his ferret-adapted distemper virus protects them against simultaneous injection of fully virulent dog-distemper virus. He goes further and produces evidence to show that the ferret-

adapted virus has a curative effect when injected into dogs during the early stages of clinical distemper.

Much speculation has been aroused as to the mechanism by which this phenomenon is produced. One explanation which has been advanced and which seems to meet the case reasonably well is based on the fact that a virus is a compulsory intracellular parasite. Before the virus particle can multiply it must enter or attach itself to a living cell. This process is envisaged as something on the lines of a chemical combination in which two atoms can combine by means of appropriate linkages. Once the links on a particular atom are occupied, no more atoms can combine with it. The virus according to this theory would have a link which would fit a corresponding link on a certain type of cell and related viruses would have the same type of link. Once the link on a particular cell had been occupied by a virus particle, no other virus particle having the same type of link could attack that cell. The situation would be something like a key in a lock. So long as the key is in the lock, no other key, no matter if it fits perfectly, can open that lock. Green explains his findings in the case of distemper on this basis. In his experiments he infected dogs with distemper by instilling virulent virus into the nasal chambers. After the usual incubation period, the dogs developed the early clinical symptoms of distemper. At this early stage of the disease, Green injected a large dose of his ferret-adapted virus by the intramuscular route and claims that this had a curative effect on the dogs. His explanation is that the infecting virulent virus has to spread slowly from cell to cell in the body of the dog and it is not until a large proportion of the susceptible cells have been invaded that serious symptoms, or death, will occur.

In the stage of early clinical symptoms, only a small proportion of the susceptible cells have been invaded. At that point a large dose of the modified virus is injected intramuscularly. This favors rapid absorption and dispersal of the modified virus through the body and so gives the modified virus the opportunity to enter those susceptible cells which have not yet been attacked by the virulent virus. These cells are then blocked against attack by the virulent virus and so the chances of recovery are improved. The chief use of Green's modified virus is, of course, as a prophylactic rather than as a curative. For this purpose it is claimed to have a great advantage over other methods of immunization in that, because of the interference phenomenon, protection is conferred very rapidly. There is no negative phase and the vaccine may be used on immediate contacts and on dogs already in the incubation stages of distemper.

Before leaving the ferret-adapted virus, it is of interest to note that the non-infectivity by contact which we have discussed in the case of rinderpest is said to be also a feature of the ferret-adapted distemper virus. In the case of foot-and-mouth disease virus too, when the virus is adapted to the guinea-pig, these animals can readily be infected by inoculation but the spreading power of the disease may be modified.

It would, therefore, appear that loss of attacking power occurs not uncommonly when a virus is passaged for a number of generations in an unusual host by artificial means.

Epidemiology

Passing now from immunity to epidemiology, I wish particularly to consider some of the features of the spread of avian pneumoencephalitis of fowls.

The history of the disease is short as compared with that of many other diseases. The first mention of it in the literature is by Kraneveld in the Dutch East Indies in 1926. In the same year Doyle studied an outbreak of disease at Newcastle in England and published his findings in 1927. Features of the disease to which Doyle drew attention were its extreme virulence as evidenced by the short duration of illness and the mortality which approximated 100%, and its differentiation from the well-known fowl plague. He showed that the cause was a virus which was immunologically distinct from the virus of fowl plague. that the disease under natural conditions, survive for long outside the body of the fowl and that in the few birds which recovered a solid immunity resulted. In his original paper, Doyle, discussing the possible source of infection, stated that no other outbreaks of this disease had ever occurred in England and that no new birds had been introduced into the flock. Pigs were kept on the poutry farm on which the disease occurred and had been fed on garbage collected in Newcastle. In discussing the differential diagnosis, Doyle mentioned the similarity in symptoms which the disease showed to outbreak of disease in fowls which had been described in America under the names of infectious bronchitis, laryngotracheitis, coryza, etc.

Within a short time of the outbreak at Newcastle, outbreaks occurred in many widely separated parts of the world, for example in 1926 in Korea, in 1927 in India and Ceylon, in 1928 in the Philippines, in 1930 in Australia. Since then outbreaks have occurred in many other places and during the war the disease became widespread in many parts of the continent of Europe, for example, in Italy, Hun-

gary, parts of Germany, etc., and in Africa.

In all these outbreaks, the mortality caused by the disease was very high, generally close on 100%. The disease has certain points of resemblance to fowl plague but a feature of the early outbreaks was that they occurred in countries, with the exception of England, which had no past history of fowl plague. Another striking feature is that in many cases the initial outbreaks occurred at large ports, for example, Newcastle, Batavia, Colombo, Manila, Melbourne and Mombasa, a fact which suggests that shipping played an important part in distributing the disease.

Many of the countries, for example, India, Ceylon and the Dutch East Indies, in which serious outbreaks have occurred, are countries in which the wild jungle fowl is native. The jungle fowl is, of course, the ancestor of all our domestic poultry. If the virus of avian pneumoencephalitis originated in the jungle fowl in bygone years, one would expect fowls in the countries where that bird is native to have developed some resistance to the disease. That, however, is not the case. In Ceylon the village breed of fowls which is not far removed from the jungle fowl, is just as susceptible to the infection as improved breeds from Europe. The same was the case in India, the Dutch East Indies and the Philippines. To my mind this high susceptibility of the native fowls of these countries indicates that the original host of the virus is not the jungle fowl, but some other species of bird. A curious feature of many of the earlier reports of outbreaks in India, Ceylon and elsewhere was mention of heavy mortality in wild birds, particularly in crows, occurring simultaneously with outbreaks in fowls.

Up to the year 1944, although outbreaks had occurred in Europe, Asia, Africa, and Australia, in all cases characterized by extremely high mortality, no outbreaks had been reported from the American continent.

Doyle, in his first description of the disease, had noted the similarity in symptoms which existed between avian pneumoencephalitis and respiratory infections which had been described in America under such names as infectious bronchitis and laryngotracheitis. In the interval between 1927 and the present time, infectious diseases of poultry characterized either by respiratory or by nervous symptoms or by both have been described in America under various names. For example, nine-day pneumonia or chicken flu were said to have been present in California as early as 1935. Stover in 1942 described a respiratory nervous disorder of chickens in California. Another disease called avian encephalomyelitis or epidemic tremor, had also been described. Pneumoencephalitis of chickens had been studied by Beach and others. These various disease all bear points of resemblance to the disease occurring at New Castle but differ from it very strikingly in the much lower mortality. Instead of a mortality approximating 100% which had occurred in England, Asia, Australia, the cotinent of Europe and in Africa, the mortality was low. In 1944, Beach announced that he had proved that the virus which was the cause of pneumoencephalitis of chicks in California was immunologically identical with the Newcastle disease. Stover's "respiratory nervous disorder of chicks" has also been proved to be the same disease. Laryngotracheitis has been shown to be due to a separate and distinct virus. Corvza of fowls has been proved to be caused by a bacterium *Haemophilus gallinarum*. The question of the identity of the infectious bronchitis of chickens which Doyle had noted in 1927 as resembling the Newcastle disease does not appear as yet to be quite satisfactorily settled. Stover in 1942 studied its relationship to what at that time he called "a respiratory nervous disorder" virus. He did not use large numbers of birds and reports that 19 chickens which had recovered from infectious bronchitis proved to be susceptible to the "respiratory nervous virus" but that 50% of chickens immune to the latter virus were refractory to infectious bronchitis. That evidence does not appear to be sufficient to separate the two viruses with certainty. Since then the "respiratory nervous virus" has proved to be the Newcastle virus. Brandly, Moses Jungherr & Jones (1946) in a paper dealing with the isolation and identification of the pneumoencephalitis virus in America, consider that the infectious bronchitis virus is separate and distinct from the Newcastle virus but the experiments on which they base their opinion are few in number and not altogether convincing. They challenged with the Newcastle virus twelve pullets believed to be immune to infectious bronchitis—and all twelve died. These twelve pullets, however, were not satisfactorily proved to have been immune to infectious bronchitis. It is stated that "they were pullets from a flock which had been exposed on range shortly before placement in laying houses." It would seem to be necessary to repeat this work using birds which had been definitely infected with the infectious bronchitis virus before it can be assumed that the two diseases are actually separate and distinct.

Epidemiologically, the great interest of the American outbreaks lies in the different manner in which the disease behaves in that country as compared with other parts of the world. In Asia, the outbreaks were dramatic in their

violence and attracted immediate attention as something new and unprecedented. The same was the case in England, Australia and Africa. On the continent of Europe the disease was at first confused with fowl plague, the only other known disease of poultry which approached it in violence. In America, on the other hand, its mildness resulted in its being unrecognized for years. One obvious conclusion which might be drawn from these facts is that fowls in America have had much longer contact with the virus than fowls in other parts of the world. As I have said earlier, the native breeds of fowls in Asia proved to be highly susceptible to the infection. Asia is the home of the jungle fowl, the ancestor of all our domestic breeds of fowl. So it would appear that the jungle fowl is not the original host of this virus.

The fowl is not indigenous to America. It was introduced into that continent by the early settlers from Europe and the fact that fowls in Europe have proved to be so highly susceptible to the virus appears to indicate that the virus was not introduced into America along with the early settlers' fowls. In that case, the probability is that the true or original host may be some wild non-migratory bird native to America. If that supposition should be correct then one would expect that what has happened is that the virus, originally a parasite of some American wild bird, had adapted itself to attack the fowls introduced into America some hundreds of years ago and at the same time the fowl in America has, to a considerable extent, developed a resistance to the virus, accounting for the low mortality there and the high mortality when it is introduced into other countries.

This very brief survey of avian pneumoencephalitis illustrates several important epidemiological features, among them the high mortality which may occur when a new virus is introduced into a susceptible population, the rapidity with which infection can be spread over great distances by modern transport, and the fact that transport of living animals is not necessary for the spread of infection. In none of the initial outbreaks of this disease in England, Asia, Australia or Africa, was there any evidence that infection had been introduced by live poultry. That this should be possible is doubtless due to the fact that the virus in the carcases of table poultry is capable of survival for long periods at low temperatures.

The most probable way in which the rapid and world wide dispersal of this disease has occurred is by means of offal containing portions of fowl carcasses being landed from ships at large ports and used for garbage feeding of pigs and poultry.

Natural Immunity

Various measures are employed by animals to protect themselves from their enemies. Speed, tooth and claw, poison, repulsive odors, concealment and inaccessible retreat are measures adopted for protection from predators or other enemies of comparable size. Against viruses, bacteria and animal parasites, entirely different measures are employed, but the purpose is the same, prolonging the life of the individual.

Protection against these smaller, but often more successful enemies, is called immunity. It is of all degrees from mild resistance to complete protection. There are two general classes of immunity: (1) Natural or species immunity, which is possessed by all members of a species or family and (2) acquired immunity, which is strictly individual and a result of experience of the individual with that particular enemy or a near relative, or their products.

Almost nothing is known of the foundation of natural immunity. From observation it is known that the tissues of certain species do not lend themselves to the incubation or growth of certain viruses, bacteria or animal parasites. For example, cattle do not acquire glanders no matter how severe the exposure—no one knows why. In many cases of natural immunity, the young possess it at birth; in others it is acquired later, sometimes not till maturity is reached but, even in such cases, it is thought to be entirely different from acquired immunity. Occasional individuals possess a natural immunity of greater or less degree to organisms to which the species as a whole is susceptible. In some cases a family possessing an economically profitable degree of natural immunity of this sort can be developed by selection from the progeny of such individuals. Poultry resistent to pullorum disease is an example of this "acquired natural" immunity.

In general pathogenic bacteria possess a high degree of host specificity, *i.e.*, a given species of bacterium attacks but a single species of host; even near related species of animals being naturally immune. But there are many exceptions to this rule; the staphylocci; streptococci, anthrax and tubercle bacteria being examples. Viruses possess less host specificity than bacteria, but they usually exhibit a high degree of tissue specificity, *i.e.*, a given virus will attack various near and more distantly related species, but in all of them it develops in the same tissue. Carré's distemper virus is a good example of this trait of viruses. Rabies virus extends its attack to all warm-blooded species and yet like other viruses invades but a single tissue.

Nonsuppurative Panniculitis (Yellow Fat) in Mink

By E. R. QUORTRUP,* D.V.M.,
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REPORTS of cases of nonsuppurative panniculitis or Weber-Christian disease in man are infrequent. It was first described by Pfeifer[1] in 1892, and since that time, some 30 cases have appeared in the literature. Duren-Reynals[2] has experimentally produced that disease in rabbits by the injection of many unrelated materials, such as viruses, bacteria and tissue extracts. Field outbreaks of nonsuppurative panniculitis in animals have not previously been reported.† McDermid and Ott[3] recently described a condition in mink which they called "yellow fat." They attribute the condition to a high protein intake. No histopathological descriptions were given in their paper; it appears, however, that the two entities are similar. Leekley[4] in Alaska, has also observed a condition called "watery hide" which may be an associated lesion of the same disease. He has made some significant observations in regard to the feeding of certain amounts of fish of a specific type. He wishes to repeat his experiments for another season before publishing his findings.

At this station we are routinely feeding protein in excess of what is considered the dangerous level without ever having developed cases of "yellow fat" in our animals. Our theory is that it is a nutritional imbalance, accentuated by, but not caused by, a high protein intake. Experiments of that nature are in progress, but it may take considerable time to arrive at a definite conclusion.

This paper is a report of cases with emphasis on the pathology of the disease. The observations were made on twelve mink received from three ranches during the summer of 1947.

The condition appeared in young mink during the early summer months, and it is generally accepted that the disease is of seasonal occurrence. However, during the pelting season in December, 1947, we also obtained adipose tissues from a local ranch, some of which showed nonsuppurative panniculitis. The pelted animals with these lesions otherwise appeared in good health and had furred out well.

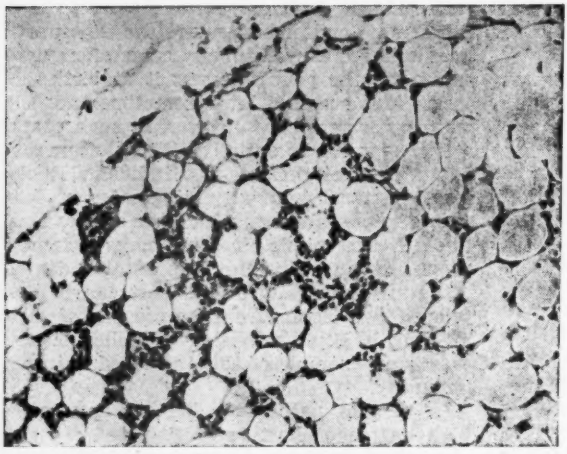

Fig. 1—Mink No. 6 Low power field (125 x) showing beginning infiltration of polymorphonuclears.

On post-mortem examination, the skin and subcutis in the inguinal region were swollen, and doughy on palpation. The abdominal muscles were usually limp and flaccid. When the skin was incised in the inguinal region, a marked subcutaneous edema was evident. No particular odor could be detected and emphysema was not observed. The subcutaneous fat in the inguinal region appeared in two distinct lateral rolls and was yellow-gray. On the cut section this fat was firm; the degree of induration was dependent on the duration of the disease. The fat showed no areas of suppuration or necrosis.

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†Since this thesis was written, Dr. T. T. Chaddock has published an article on "fatty degeneration of the liver" of nutritional origin occurring widely on mink ranches. The condition appears to be similar to the one here described. Vet. Med. 43:5, pp. 197-199 May 1948).

The pleural cavity in some instnces contained a small amount of serosanguineous fluid; the serous surfaces showed no changes. The heart and lungs were apparently normal, although the latter manifested varying amounts of hypostatic congestion. The peritoneal surfaces were normal in color and luster; the cavity in a few animals contained a serosanguineous exudate. The spleen usually appeared normal in color and size, but in some animals it was enlarged to one and one-half times normal and mottled. The liver and kidneys were normal in appearance. The gastrointestinal tract revealed no gross abnormalities. The thymus and pancreas were hyperemic. This finding is not considered significant as it is found in a variety of conditions. The lymph nodes were not enlarged. The perirenal and omental fat were canary yellow, and on the cut section revealed no areas of neerosis or suppuration.

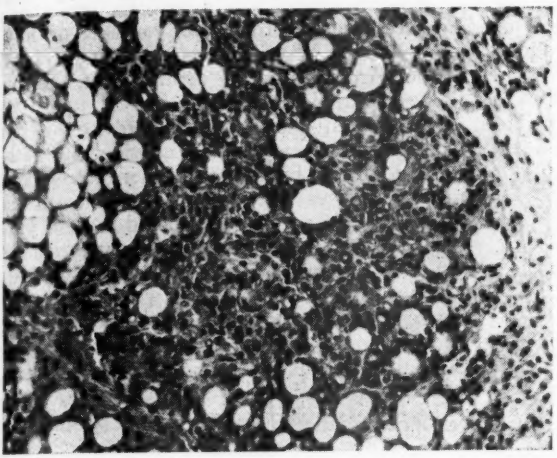


Fig. 2—Mink No. 7 Low power field (125 x) showing proliferation of fibroblasts and replacement of adipose tissue.

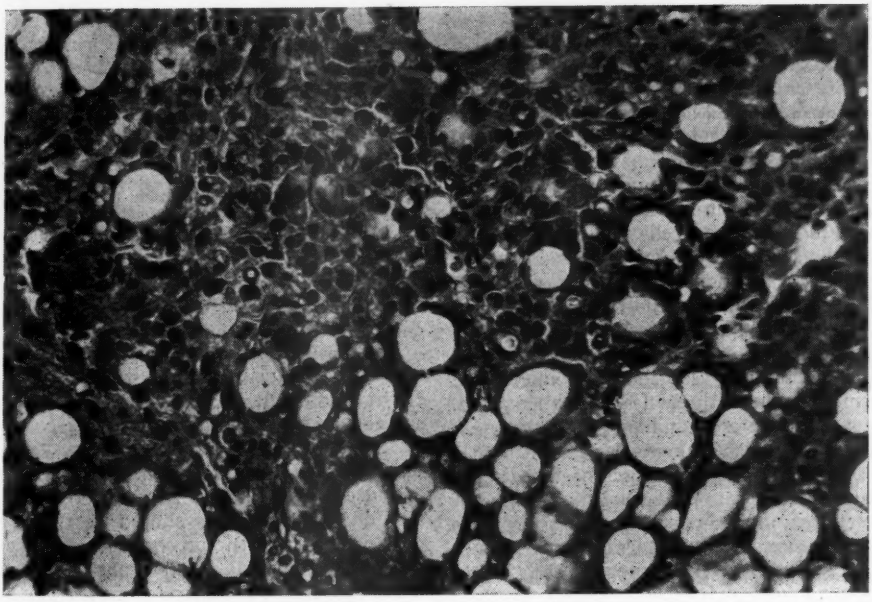


Fig. 3—Mink No. 7 High power field (275 x) showing mononuclear infiltration and some fibrosis.

Tissues from 12 animals obtained from three ranches were studied histologically. The only

significant and constant pathological changes noted were disseminated, nonsuppurative inflammation of the adipose tissue (panniculitis) involving the subcutaneous and visceral fat.

The cellular infiltration of the fat in the early stages of the disease consisted chiefly of polymorphonuclear cells, but occasional lymphocytes, plasma cells and macrophages were noted (Figure 1). Multinucleated giant cells were not present in any of the sections studied. The inflammatory cells were seen mainly in the

Nonsuffurative panniculitis is due to a nutritional imbalance that is accentuated by a high protein ration.

intra- and interlobular connective tissue, but occasionally were seen infiltrating into the periphery of individual fat cells. The interlobular septa in the subcutaneous fat appeared edematous and even fibrinous in some areas. Here and there occasional fat cells were filled with a pink-staining precipitate, presumably fat necrosis, but this fat alteration was minimal. Many of the inflammatory cells showed some degree of disintegration with nuclear fragmentation. There was moderate capillary congestion associated with the inflammatory process.

Sections taken at later stages of the disease revealed a proliferation of fibroblasts with replacement of the adipose tissue. There was also an accompanying infiltration of mononuclears (Figure 2). Some of the mononuclears showed refractile granules in their cytoplasm, probably fat. In older lesions the fibrosis was marked and accounted for the palpable induration. Special stains for bacteria failed to reveal any micro-organisms in the tissues. Some sections from tissues which had been stored at a temperature below 0° F. for some time exhibited areas of inflammation without cell nuclei. It was thought that these changes were due to autolysis. The architecture of the lesions appeared identical with typical areas of adipose inflammation.

The skin showed a thin, atrophic epidermis. In places, the epidermal layer consisted of only a single layer of cells. The collagenous fibers of the dermis had a loose arrangement, and the tissue appeared edematous.

The spleen showed some atrophy of the malpighian corpuscles and considerable reticulo-endothelial hyperplasia. There were many megakaryocytes scattered through the splenic pulp, but they are not considered to be a part of the reactive hyperplasia since megakaryocytes are present in the spleens of normal mink.

Some of the lymph nodes were moderately congested and edematous, the edema being present for the most part in the trabeculae. All other organs including the liver, kidney, pancreas, heart, bladder, stomach and intestine appeared essentially normal.

Summary

Gross and histopathological lesions of nonsuppurative panniculitis of mink are described. The microscopic lesions in the adipose tissue are indistinguishable from those of Weber-Christian disease of humans. The disease described appears to be identical with the condition known as "yellow fat" or "watery hide," the etiology of which has not been definitely determined.

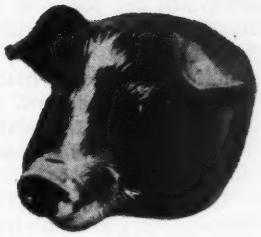
References

1. Pfeifer, V. *Deut. Arch. f. klin. Med.* 50, p. 438. 1892.
2. Duren-Reynals, F. A necrotizing disease in rabbits affecting fatty and muscular tissues, *Yale J. of Biology and Med.* 18:6, July 1946.
3. McDermid, A. M., and Ott, George L. "Yellow Fat" as Observed in Mink, *J. of A.V.M.A.*, 110:1, January 1947.
4. Leekley, James R., Experimental Fur Station, Bureau of Animal Industry, Petersburg, Alaska. Personal communication.

Hydrocephalus in mink is widely distributed, but it is difficult to determine its prevalence, since affected kittens often die soon after birth and are eaten by the dam. This also makes eradication of the taint difficult. When a hydrocephalic kitten is discovered, the sire and dam and all sibs should be marked for elimination from the breeding herd and pelted in season. This plan will probably not eliminate this heritable factor from the ranch but it should prevent its increase among the breeding mink.

A valuable shipment of mink being sent to Norway encountered storms and the plane ascended 14,000 feet with no resulting harm to the mink.

Sulfamethazine in the Treatment of Pasteurellosis and Dysentery in Swine



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THE degree of success in the treatment of swine diseases makes or breaks the hog grower. The sulfa drugs, judiciously used, can make pork production profitable. Many bacterial diseases which can be controlled with sulfonamides occur even though good management, proper sanitation and feeding methods are practiced.

Pasteurella infections and dysentery are near the top of the list of costly diseases. Death losses are high, and these, together with losses due to stunting, often make a pig crop unprofitable. Although some authorities have questioned its existence as a specific disease,[1,2] pasteurellosis does occur as a primary disease in swine[3,4] with mortality losses up to 75%. It is caused by the organism *Pasteurella multocida*, sometimes complicated with Salmonella and other organisms.

Swine dysentery is an acute, infectious, highly fatal disease characterized by bloody diarrhea. The cause of swine dysentery, until recently, has been considered as unknown. However, Doyle[5] reported the isolation of a vibrio in pure culture from the colon mucosa of a hog with dysentery. This organism was propagated on an artificial medium. Dysentery developed in 50 of 60 pigs to which the culture was fed, and did not occur in the control animals. The great economic importance of dysentery in sections where the raising of swine supplies a major portion of farm income, has been reported frequently.[6,7,8,9]

Fox and Burkhart[10] used sulfamethazine in the treatment of hemorrhagic septicemia in swine, from which *Pasteurella multocida*, Type I, was isolated. A sterile solution of the sodium salt was administered, subcutaneously, at a dosage of 1.5 grains per pound of body weight on the first day, and one grain per pound on the second and third days. The pigs were separated in groups for treatment, according to the length of time they had been sick. Immediate and dramatic response was obtained in the treatment of early cases, but delay in instituting treatment decreased the percentage of recoveries.

While sulfaguanidine, sulfasuxidine, and sulfathalidine have been used with good results in the treatment of various enteric disorders in swine, little has appeared in the literature regarding sulfonamide treatment of dysentery. Graham and his associates[11] used sulfathalidine successfully in five clinically affected pigs at the rate of approximately 0.5 grain per pound of body weight. Three similarly affected pigs were treated with fish oil and recovered, though less rapidly than those given sulfathalidine. Fifty-seven apparently healthy pigs in the same herd were fed sulfathalidine and did not develop the disease. Doyle[8] and Hastings[12] have reported some benefit from sulfonamide treatment, but maintain that these drugs appear less effective in dysentery than in other forms of enteritis.

When the new sulfonamides were first used in the treatment of gastroenteritis due to bacteria in man, it was felt that high concentrations of the sulfonamides in the lumen content was essential for successful treatment. Sulfaguanidine, sulfasuxidine, and sulfathalidine, being poorly absorbed, would establish these high concentrations, and they were used with some success. Later, it was discovered that greater success followed the establishment of effective concentrations of the drug in the intestinal mucosa, adjacent tissues, and blood stream, and that this could be accomplished only with drugs that were readily absorbed and maintained high blood concentrations, such as sulfadiazine, sulfamethazine, and sulfamerazine. The slowly absorbed sulfonamides, therefore, are no longer used in human medicine for this purpose. Francis[13] also stated that treatment of an infection in the intestinal mucosa with a readily absorbed sulfonamide which would establish and maintain an effective blood level, has been shown to be superior, and sulfamethazine and sulfamerazine should be most effective in pigs.

The importance of establishing and maintaining adequate blood levels of sulfonamides quickly has been stressed frequently. Burkhart, Schroeder, Welch, and Langer,[14] in their work on normal swine, have shown that optimum blood concentrations of sulfamethazine are obtained on the first day at a dosage of

1.5 grains per pound of body weight, and are maintained on one grain per pound on subsequent days, by both parenteral and oral administration, once daily. Higher blood levels can be achieved, and persist for a longer period, on less frequent intake than is the case with the other, commonly used sulfonamides.

This paper is a report on the clinical use of sulfamethazine in the treatment of pasteurellosis (hemorrhagic septicemia, swine plague) and dysentery (hemorrhagic dysentery, bloody diarrhea, vibrio dysentery) in swine.

Background

The commercial production of hogs is concentrated and well established in the North Central states—the so-called corn belt. Approximately 265,000 pigs are raised in Rush County, Indiana, each year. Most of the herds average between 100 and 200 animals. Usually, two litters a year, and, in some cases, three litters, are raised. All slaughter pigs are farrowed on the premises and are marketed at five to six months of age when weights usually range between 230 and 250 pounds. Crossbred pigs are now generally raised for meat purposes.

All pigs are grain fed, and timothy and clover pastures are maintained for grazing. The McClean County system of sanitation and pasture rotation is practiced. Water is supplied at fountains and range shelters are provided. All equipment is movable to facilitate pasture rotation and sanitation.

Pigs are routinely immunized against cholera at 10 to 12 weeks of age.

Pasteurellosis (Hemorrhagic Septicemia)

Sulfamethazine has been used in natural field outbreaks in the treatment of 180 cases of pasteurellosis in nine herds, over a period of about nine months.

Pasteurellosis has recurred each year on farms in this vicinity, usually in the fall and early winter, and death losses of 15 to 25% have been experienced. However, during the past year, the highest incidence occurred during June, July, and August. The resistance of the animals was probably lowered because of the unseasonably wet weather and cool nights.

Clinical Description.—Pasteurellosis has occurred most frequently in pigs weighing 50 to 150 pounds. The duration of illness in the cases treated ranged from one day to two weeks. Many acute cases became toxic over night and died quickly. However, the characteristic initial symptoms usually observed were lack of appetite and rapid respiration. Within 24 hours, there was complete inappetence, difficult respiration, severe thumping, mucoid nasal discharge, and temperatures between 105° and 107° F., and, in some cases, as high as 109° F. Extreme weakness and emaciation became pronounced, and death followed.

Gross Pathology and Bacteriology. — To check field diagnoses, necropsies were performed, and spleen, lung, kidney, and lymph nodes submitted to a diagnostic laboratory for examination.

Lesions of pneumonia were evident on autopsy. Hemorrhagic and congested areas in the lungs were extensive. The involved areas presented a mottled appearance, and, in many cases, had progressed to the stage of gray hepatization. In some animals, the parietal pleurae adjacent to the involved lung areas were inflamed. Frequently the spleens were enlarged and hemorrhagic. Other organs showed no gross abnormalities.

Pasteurella multocida[15] *(suiseptica)* and diphtheroids were isolated on laboratory examination.

Treatment.—All visibly ill animals were isolated. Sodium sulfamethazine 25% weight/volume sterile solution was injected intraperitoneally at a dosage of one grain per pound of body weight. Usually, one treatment was sufficient, but, where necessary, treatment was repeated in 24 hours. Porcine mixed bacterin was given to all normal pigs in the affected herds.

Results. — Dramatic clinical improvement was usually apparent within 12 hours. In 24 hours, the pigs were active, appetites were good, and temperatures were normal. Thumping had ceased within 24 to 48 hours and recoveries were uneventful. One hundred seventy-one pigs of the 180 treated, or 95%, recovered. Table I summarizes the treatment of pigs in field outbreaks of pasteurellosis.

Typical Outbreaks

In my experience, the following three reports are typical of sulfamethazine treatment of pasteurellosis in swine.

Herd 1.—Thirteen of a total of 82 pigs, weighing approximately 60 pounds each, became ill over night. There was severe thumping and the temperatures ranged from 105° to 107° F. Twelve recovered following one treatment with sulfamethazine and one required two treatments. All were marketed at the scheduled time weighing more than 200 pounds each.

Herd 2.—Of a herd of about 200 pigs, a few died each week showing symptoms of pasteurellosis. At the end of two months, the herd numbered 141. An acute outbreak occurred and 20 additional animals died before treat-

ment was instituted. At necropsy, there was almost complete lung involvement. Thirty-two pigs, averaging about 135 pounds, were treated. A very unfavorable prognosis was given for 16 of the animals. One injection was administered at approximately one grain per pound. In 29 animals, remarkable improvement was apparent within 24 hours and complete recovery was uneventful. While there was some immediate improvement, the three remaining sick pigs eventually all died.

Herd 5.—Shortly after vaccination for hog cholera immunization, pasteurellosis appeared in a herd of 150 shotes. Five died during the week preceding treatment. Twenty-one others were visibly sick and were isolated. Temperatures, as high as 109° F. were noted. Extreme weakness and emaciation were apparent, and the severe thumping had resulted in almost complete exhaustion in many animals. To rule out cholera, autopsies were conducted which revealed only extensive lesions of pneumonia.

The 21 pigs were treated at a dosage of one grain of sulfamethazine per pound. One died within 24 hours. The others showed marked clinical improvement in 24 hours; appetites had improved, and temperatures were normal. In 48 hours, thumping had ceased. There were no deaths other than the one that occurred the first 24 hours following the beginning of treatment.

TABLE I.—SULFAMETHAZINE TREATMENT OF PASTEURELLOSIS IN SWINE

Herd	Number of animals treated*	Approximate weight	Died before treatment	Temperature at start of treatment	Results		
					Recovered	% recovered	Died
1	13	60 lbs.		105-107° F.	13	100	
2	32	135 lbs.	20		29	90	3
3	17	150 lbs.		106-109° F.	17	100	
	10	100 lbs.		106-109° F.	10	100	
4	5	150 lbs.			5	100	
5	21	80 lbs.	5	105-109° F.	20	95	1
6	13	50 lbs.	2	105-107° F.	13	100	
7	43	80 lbs.	5		41	95	2
8	14	125 lbs.	5		12	86	2
9	12	100 lbs.			11	92	1
Totals	180				171	95	9

*Treatment: Sodium sulfamethazine 26% w/v sterile solution, intraperitoneal injection. (Approximately one grain per pound body weight.)

Discussion

Mortality from pasteurellosis has always been significant in this locality. Few acutely affected animals recover, and, in those that do, the disease usually assumes a chronic form and they finally die. Bacterins have been somewhat helpful in preventing the disease, but an effective treatment has been lacking heretofore. Therefore, sulfamethazine has a definite place in swine practice. Its activity against pasteurella organisms in many species of animals has been shown by Francis,[13] on the basis of his own work and that of others. Effective blood concentrations persist on administration once daily because of its more complete absorption and slow excretion as compared with many other sulfonamides. In my own practice, rapid reduction of fever has followed the use of sulfamethazine in pigs affected with pasteurellosis. Appetites quickly returned to normal, and emaciation and dehydration did not take place in cases treated on the first appearance of symptoms, and were halted in cases where treatment was instituted several days after the onset of the disease. No toxic reactions were observed following the use of sulfamethazine.

Post-mortem examinations of pigs, and, if possible, bacteriological examinations, are of great importance in the diagnosis of pasteurellosis. Because of the similarity of the symptoms usually seen and those of hog cholera and other disease conditions, these additional precautions are necessary.

Sanitary procedures and good management must be stressed for optimum results. Sick animals should be moved to clean, dry pens, free from drafts. An ample supply of clean drinking water and a balanced ration should be provided. Good management and proper sanitary practices will aid in the prevention of this disease, and treatment with sulfamethazine will markedly reduce losses when it occurs.

Swine Dysentery

The writer has used sulfamethazine in two outbreaks of swine dysentery, with a total of 119 animals affected. While the number of animals treated is small in relation to the total numbers needed for the proper evalua-

tion of a sulfonamide, the results were significant, and further work on the treatment of dysentery with sulfonamides is certainly indicated.

In my experience, dysentery has occurred in pigs of all ages. Diarrhea is an early symptom and the discharge contains blood and mucous. Usually, the pigs become toxic, and, frequently, inappetence follows. Temperatures range between 105° and 106° F. Many pigs die quickly—within 12 to 24 hours—but some are sick for a week or more before they succumb. Sick animals lose weight rapidly and become dehydrated.

At necropsy, the findings were largely confined to the cecum and colon which contained bloody material and mucous. Usually, there was edematous thickening of the bowel wall. No other lesions were found.

In one herd, seven pigs had died before treatment was instituted. Eighty-nine animals, weighing 85 to 110 pounds, were treated. Sulfamethazine powder was mixed with the feed at a concentration of 0.5%, and was fed for four days. Only as much food as was readily consumed was given. By the third day, definite clinical improvement was apparent and the appetites had improved. Within five or six days, all pigs were alert, had normal appetites, and the diarrhea had ceased. However, within 20 days, there was recurrence in six animals. Strict sanitation should be used to prevent such recurrences. These six animals were treated again as before. Complete recovery followed. All pigs were marketed at about five months and weighed approximately 173 pounds at that time.

In the second herd, two sows and eight suckling pigs had died prior to treatment. Two pigs were moribund and were not treated. Thirty four week-old sucklings were given one intraperitoneal injection at a dosage of one grain per pound of body weight. In 24 hours, marked clinical improvement was noted. Because of the severity of the outbreak, treatment was repeated in 48 hours. Within 24 hours following the second treatment, the appetites were normal and the diarrhea had ceased. Because of the outbreak in both sows and sucklings, the pigs were weaned at about six weeks of age, and immunized against cholera shortly thereafter. When seen one month later, all pigs appeared normal, were gaining weight, and there had been no further deaths or recurrence of the infection.

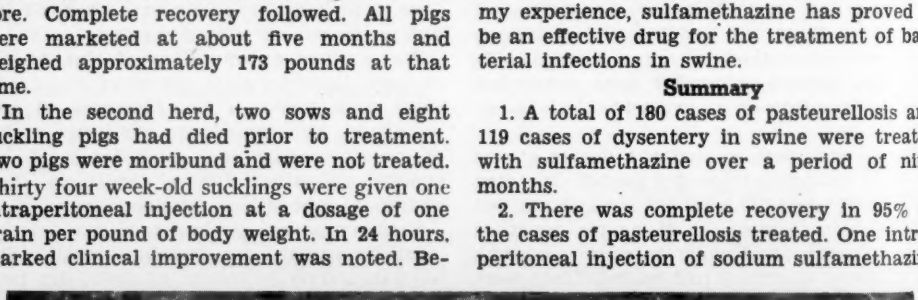
Previously I have used sulfaguanidine in outbreaks of dysentery. Fair results were obtained, but the recuperative period was much longer than with sulfamethazine therapy. It would appear that sulfamethazine, because of its rapid and more complete absorption, establishes adequate concentrations in all tissues of the body where there is normal circulation. Its action is not limited as in the poorly absorbed sulfonamides. In the two outbreaks described, there was a mortality of less than 1%. Other workers[7,8,12] have reported mortality rates in untreated herds ranging from 70 to 90%, and 25 to 50% in herds where strict sanitary measures were instituted to control the disease.

In treating swine under field conditions, it is difficult to know the specific organism causing the infection. Laboratory findings can rarely be obtained in time to serve as a guide for treatment. Therefore, a sulfonamide should be selected which is readily absorbed and which has a wide bacteriostatic range. In my experience, sulfamethazine has proved to be an effective drug for the treatment of bacterial infections in swine.

Summary

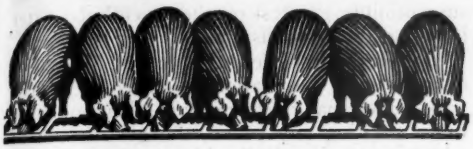
1. A total of 180 cases of pasteurellosis and 119 cases of dysentery in swine were treated with sulfamethazine over a period of nine months.

2. There was complete recovery in 95% of the cases of pasteurellosis treated. One intraperitoneal injection of sodium sulfamethazine



at a dosage of approximately one grain per pound of body weight resulted in recovery of 169 cases. Two treatments were required in two cases. Nine animals died.

3. Infection was overcome in 118 cases of dysentery, or a recovery of 99%. Sulfamethazine powder was administered in the feed at a concentration of 0.5% to 89 pigs, and two intraperitoneal injections at a dosage of one grain per pound of body weight at a 48-hour interval were administered to 30 pigs.



Sulfamethazine in the feed overcame infection.

4. There were no toxic reactions in any of the animals treated.

Bibliography

1. Schalk, A. F., and Roderick, L. M. Pathogenicity of *Bacterium suisepticus* for hogs. *J.A.V.M.A.*, 62 (n.s. 15), p. 343. (Dec.) 1922.

2. Runnels, R. A. Animal Pathology Iowa State College Press, Ames, Iowa, p. 518. 1946.

3. Schofield, F. W., and Ingle, R. T. Natural and experimental hemorrhagic septicemia in swine. Rept. Ont. Vet. College, p. 23. 1940-41.

4. Kinsley, A. T. Hemorrhagic septicemia (swine plague). *Vet. Med.*, 32, p. 150. (Mar.) 1937.

5. Doyle, L. P. The etiology of swine dysentery. *Am. J. Vet. Res.*, 9, p. 50. (Jan.) 1948.

6. Hofferd, R. M. Diagnosis and control of some communicable swine diseases. *Cornell Vet.*, 34, p. 152. (Apr.) 1944.

7. Hofferd, R. M. Swine dysentery in Iowa from a field standpoint. *J.A.V.M.A.*, 88, p. 299. (Mar.) 1936.

8. Doyle, L. P. Enteritis in swine. *Cornell Vet.*, 35, p. 103. (Apr.) 1945.

9. Doyle, L. P. Swine dysentery. *J.A.V.M.A.*, 106, p. 26. (Jan.) 1945.

10. Fox, O. K., and Burkhart, R. L. Hemorrhagic septicemia in swine controlled with sodium sulfamethazine. *Vet. Med.*, 42, p. 379. (Oct.) 1947.

11. Graham, R., Peterson, E. H., Morrill, C. C., Hardenbrook, H. J., Whitmore, G. E., and Beamer, P. D. Studies on porcine enteritis. I. Sulfathalidine therapy in treatment of natural outbreaks. *J.A.V.M.A.*, 106, p. 7. (Jan.) 1945.

12. Hastings, C. C. Gastroenteritis of swine. *Cornell Vet.*, 37, p. 129. (Apr.) 1947.

13. Francis, J. Bacterial chemotherapy in veterinary medicine. *Vet. Rec.*, 59, p. 131. (Mar. 22) 1947.

14. Burkhart, R. L., Schroeder, C. R., Welsh, M., and Langer, P. H. Sulfamethazine blood concentrations in swine. *Vet. Med.*, 43, p. 80. (Feb.) 1948.

15. Breed, R. S., Murray, E. G. D., and Hitchens, A. P. Bergeys Manual of Determinative Bacteriology. The Williams & Wilkins Co., Baltimore, Md., p. 546. 1948.

In a study of the effect of fatness on the tenderness of lamb, conducted at the Texas experiment station, it was decided that it has no effect. In the experiment, paired lambs of the same age, weight and breeding were used. One was fed a ration that promoted rapid growth and accumulation of flesh, the other a ration that barely supported moderate growth and provided little or no gain in weight. On testing the flesh after slaughter there was no correlation between fatness or leanness and tenderness of the muscle meat.

Huddleson's Brucellosis Vaccine

Few things could better illustrate the world-wide interest in bovine brucellosis than the diverse regions from which inquiries concerning Huddleson's new "Brucella M vaccine" have come following the first published mention of this product.[1] Although it was stated, that notwithstanding 3,000 animals in 48 herds had been vaccinated experimentally, large scale field tests would be conducted in Michigan, before decision as to the value of the vaccine and the best means of employing it in the control and eradication of brucellosis in cattle was made. It was plainly inferred the vaccine would undergo further tests, on perhaps hundreds of thousands of animals, before the matter of marketing it would be considered. Nevertheless inquiries for the Huddleson vaccine have come from practically every country on the globe where the cattle industry is important.

The new vaccine contains both live and killed bacteria of one of the mucoid phases of *Brucella suis*.

On the basis of the experimental trials of this vaccine so far conducted it can be said:

1. It does not cause infection in cattle.

2. The mild to moderate positive reaction it induces in vaccinated cattle disappears within a few weeks; in all cases within 90 days.

3. The immunity induced by the vaccine affords a high degree of protection against infection from ordinary exposure for a period of at least two years. This statement is based upon use of vaccine in newly infected herds.

During the development of the vaccine, it appeared at one time to have considerable therapeutic value. This is not now considered important. In tests on a much larger number of definite reactors and suspects approximately 12% of the former and 43% of the latter have ceased to react after periods of varying lengths. As this is near the normal percentage of "ceased reactors," influence of the vaccine is not regarded as significant.

[1] *Vet. Med.*, 42:7, p. 282. (August), 1947.

CURRENT HOG CHOLERA PROBLEMS*

HOG cholera has been less prevalent in the corn belt during the last several years, than it was before the war. This is believed to be due, indirectly, to the high price of hogs, which has induced farmers to vaccinate a much larger percentage of the swine than heretofore. But the pendulum will swing back again. A sufficient numbers of farmers neglect vaccination to maintain the disease, even during these times of high-priced feed and skyrocketing live stock markets. With a slump in hog prices, decreased vaccination and big losses from cholera will come once more. Then the same old problems—lots of enteric diseases in wet seasons, farmer vaccination of pigs with salmonella infection, failure to obtain immunity in pigs vaccinated while nursing immune sows, vaccinating after exposure to cholera, cholera breaks etc., will plague us again.

Enteritis in swine is due to a number of causes, chief among them being *Salmonella choleraesuis (B. suipestifer)*. Next in importance is the *Pasteurella suilla (B. suisepticus)*, then follows acute streptococci infection, which is more prevalent of late years than formerly. vibrio colitis, and virus enteritsi of young pigs.

Of course swine must be healthy when vaccinated. No veterinarian would expect to produce a strong, long lasting immunity in a sick animal. There is a reason even more important than failure to produce immunity for not vaccinating a pig suffering from enteritis. If pigs with salmonella infection are injected with hog cholera virus, all one can do afterwards is watch them die, and they do it promptly, usually one or two days after symptoms are manifest.

If the danger of cholera is too imminent to admit of delay the animals may be given serum alone and treatment instituted for relief of the enteritis. It is important to keep in mind that serum alone confers only passive immmunity, which is fleeting. If the danger of cholera infection persists—as it usually does—the serum injection must be repeated in not longer than 21 days. If the swine have recovered from the enteritis by that time virus also may be given. Otherwise permanent immunization will have to be again deferred.

The injection of hog cholera virus into hogs suffering from enteritis due to causes other than *S. choleraesuis* is not quite so disastrous, but is bad enough. When the infecting agent is a Pasteurella or a Streptocoeus death is not so sudden. Such pigs usually begin to die about the tenth day after vaccination. The leucopenia caused by hog cholera virus reaches its lowest point and consequently the resistance of the animal to intercurrent infections is lowest and susceptibility greatest on the seventh day after injection of the virus.

Within the last decade, what is spoken of as delayed virus vaccination, has become popular with a good many veterinarians. It is employed in vaccinating any swine, the good health of which is questioned. By this method the serum, a large dose, is given first and the virus is given 10 days later. Sometimes the virus is given only four to seven days later, but this period cannot be recommended since it may not result in solid immunity. The plan possesses several advantages over giving serum alone. Although the animals must be handled twice but one dose of serum is required instead of two or more as when serum alone is given. The safety to the animal seems about the same as when serum alone is given. That is, in 10 days the serum builds up such immunity to the virus that the latter doesn't "set them afire" as it does if given to an enteritis infected pig simultaneously with the serum. It is hazardous to delay the injection of the virus for more than 12 days after the serum is injected. If injection is delayed more than 20 days an acute attack of hog cholera is probable. It is practically certain if the delay is 30 days or longer.

Another stop signal for the injection of virus is pox. If the pigs have pox and are lousy, they won't have pox except they have lice, they should not be vaccinated until they have recovered from the pox. If the danger of exposure to cholera is great, they may be handled as pigs having enteritis are handled, i. e. given serum alone or the delayed virus vaccination method may be employed.

Pigs farrowed by hog cholera immune sows, usually receive immune bodies in the colostrum and possess a considerable degree of passive immunity. This resistance to the disease persists for about tix weeks or twice as long as the immunity conferred by an injection of hog cholea antiserum.

This immunity of pigs, farrowed by cholera immune sows, is not sufficient to protect them from mass infection and it is sometimes desirable to vaccinate them against cholera. The more so as one cannot be sure how much resistance they possess or how long it may last. It sometimes persists considerably longer than six weeks. It renders successful vaccination quite difficult. After much trial and error experience, a routine has been developed that

*Notes from an address by Dr. J. D. Ray, Omaha, Nebraska, at the 65th annual meeting of the Michigan State Veterinary Medical Association, at Lansing, June 24-25, 1947.

gives good results in this type of pigs. Simply give the usual dose of antiserum and a large dose of virus. Never give less than 3cc of virus to these pigs and it is better to give them 5cc. This amount of virus breaks their passive immunity obtained from the sow and enables them to develop an active immunity of their own, just as non-immune pigs develop it from ordinary vaccination. Some of these litters from immune sows can be permanently immunized by given them virus and no serum, but that method is hazardous since some, and perhaps many, litters so treated will develop acute hog cholera and die.

The way virus is handled influences critically

Swine must be healthy when vaccinated.

the degree and length of the immunity acquired by vaccination. There is no poor serum on the market, but the quality of virus is another matter. Drug store virus is apt to be weak when obtained. It can't be kept at room temperature without deterioration nor safely transported, even from the veterinarian's office to the farm, without refrigeration. Although a virus may be still virulent, if weakened the immunity it produces will be short-lived.

Cholera breaks or vaccination breaks are encountered by most veterinary practitioners from time to time. There are various causes for them. An occasional hog appears to be inherently unable to develop an immunity to hog cholera. A good many practitioners inject the serum into the peritoneal cavity. Occasionally it is deposited into the bladder or the lumen of the gut and of course the pig develops hog cholera from the virus injection. The virus may be weakened or inert from abuse as has been mentioned and only passive or short-lived active immunity will result from the vaccination. But by far the most common cause of vaccination breaks is bacterial infection in the swine, at the time of vaccination.

During the past season outbreaks on acute virus diarrhea of young pigs has appeared widely over the corn belt. We are prone to think of it as a new disease, but its wide distribution would seem to indicate otherwise. Doyle observed it in Indiana four years ago, but in the Missouri Valley country it attracted no attention till last spring (1947).

Virus diarrhea or enteritis is extremely destructive to young pigs. In pigs up to 10 days or two weeks of age the mortality is often 100%. Swine of all ages are susceptible, but the mortality is low in pigs more than two weeks of age and there is practically no death loss in shotes and mature animals.

In pigs less than a week old all, or nearly all, the litter may be attacked at the same time and all may be dead in 18 hours, although a course of two to three days is more common in this disease. The symptoms are uncontrollable diarrhea with yellow or white feces and persistent vomiting. Dehydration is extremely rapid in pigs of this tender age.

The constant necropsy lesion is extreme congestion of the mesenteric blood vessels. Sometimes urates may be found in the hilus of the kidney.

In shotes and sows the disease runs a course of three to four days and ends in recovery. characteristic symptoms are vomiting and diarrhea. Lactation is decreased and frequently suspended in sows that are suckling pigs.

We don't know where the infection comes from or how the swine on a given farm acquire it. So far there appears to have been no spread from farm to farm. That is occurrence has been sporadic; seldom on more than one farm in a community. Should it take on the characteristic of an epizootic and spread like hog cholera for example it would constitute a major disaster for the middle western states, where corn is the principal cereal crop, and swine raising a leading livestock industry.

The only way that we know of to get rid of the infection once it gains access to the premises is to provide a break in the farrowing season. If no pigs are farrowed for a period of several months the infection appears to die out.

The hog cholera vaccines crystal violet and Boynton's tissue vaccine (BVT) have the same limitations and produce the same immunity as the virus with the following exceptions.

1. Since the virus in these vaccines is inactivated it does not cause an exacerbation of concurrent *S. choleraesuis* or other infections.

2. The immunity induced by vaccination with these vaccines is probably not safely solid for much longer than six months.

3. It requires three weeks following vaccination for a serviceable immunity to develop.

The speaker further stated his experience with crystal violet and BVT hog cholera vaccines had been too limited to permit discussion of them.

Veterinary Problems in Poultry Production

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According to recent research work conducted at the Ohio Agricultural Experiment Station (Farm and Home Research, 32:1,3, 1947), chicks up to 12 weeks of age do not need granite or similar hard grit when fed an all-mash starter. After the first 12 weeks, it was found that the birds receiving coarse feed (including whole corn and oats) made better gains per pound of feed when a hard grit was added to the ration. No benefit was derived from feeding grit when the feed was finely ground. It was found that layers definitely need a hard grit, and that neither oyster shells nor limestone grit will serve as substitute for granite grit, but must be fed as a supplement. Crushed silica gravel grit proved to be somewhat superior to granite grit for laying hens.

New Method of Laryngotracheitis Prophylaxis

A new method of vaccinating chickens against laryngotracheitis has been described by Molgard and Cavett *(Poultry Science,* 26:563, 1947). These investigators reported that when laryngotracheitis vaccine is brushed into the feather follicles in a manner similar to the method used for fowl pox vaccination, a "take" or reaction resembling a pigeon pox vaccination "take" is obtained. This reaction reaches its peak on about the fifth day and usually disappears by the seventh or eighth day. They claim the immunity obtained is equivalent to that of the standard method of injecting the vaccine into the vent or bursa of Fabricius. According to them, the feather follicle reaction is easier to read and less exudate is expelled.

In applying the vaccine, ten feather follicles were inoculated, and birds ranging from two weeks to maturity were vaccinated with equal success. Wing-web vaccination by the stick method failed to induce immunity. Birds vaccinated simultaneously with fowl pox vaccine by both the stick and feather follicle methods gave satisfactory results for both viruses.

Six commercial laryngotracheitis vaccines were tested, and five gave satisfactory results by both technics. One vaccine which gave a good reaction by the vent method failed to give a feather follicle reaction. For obvious reasons this new technic for laryngotracheitis vaccination should be used only when the manufacturer of the vaccine recommends it. No doubt most manufacturers will soon determine if their product is suitable for use by this technic.

The parrot is one of the birds that is susceptble to the human type of tuberculosis. Most of the cases of this disease recognized in parrots have been pets to tuberculous patients.

McKay (*Vet. Jour.* (British) 104:70, 1948) has suggested iodine for treatment of the Hemophilus type of fowl coryza. His method consists of treating the drinking water so that it contains one part of free iodine to 20,000 parts of water, obtained by adding one teaspoonful of Lugol's solution to every gallon of water. In addition to iodizing the water, the atmosphere surrounding the birds is disinfected with iodine vapor. The vaporizing was accomplished by placing shallow dishes containing 10 grams of resublimed iodine at enough locations in each house to allow one dish for each 200 cubic feet of air space. The high degree of recoveries following the treatment of 25,000 young birds on five ranches, indicates that his method of treatment may have merit.

The possibility that hatching egs may be a source of avian pneumoencephalitis has been suggested by several investigators. DeLay (*Science,* 106:545, 1947) isolated the virus from the yolk sacs of four-day-old chicks, chick embryos, and infertile eggs obtained from two flocks known to have been suffering from the disease at or near the time the eggs were laid. Previously, Van Roekel, and Jungherr (both quoted by DeLay) had reported the isolation of the virus from fresh eggs laid during and at the end of outbreaks. Beach (also quoted by DeLay) isolated the virus from the ovarian tissue of a hen. In spite of these reports which show the possibility of egg transmission, millions of chicks have been sold without evidence that this is an important source of infection. It is the general consensus of researchers in this field that the majority of infected embryos die before hatching time, and this accounts for the small number of isolations from chicks, known to have come from infected flocks. The investigations of several workers also indicate that flocks which recover from Newcastle disease transmit some immunity to the chicks. Brandly, Moses, and Jungherr (*Am. J. Vet. Res.* 7:243, 1946) found this immunity to last for two to six weeks after chicks were hatched.

Reflections on the Respiratory Virus Diseases of Chickens

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THERE is an unaccountable synchronism in the occurrence of the respiratory diseases of chickens, not only in different flocks in the same area, but in various parts of the United States.

Vital statistics are lacking as to the exact prevalence of these respiratory diseases. If the sum total of economic loss, complications, and sequelae resulting from these respiratory diseases could be obtained, it would at once promote these infections into the rank of the most serious diseases of chickens.

For the convenience of discussion, the respiratory virus infections of chickens are defined to include infectious bronchitis, infectious laryngotracheitis, avian pneumoencephalitis or Newcastle disease, diptheritic form of fowl pox, the chronic respiratory disease reported by Delaplane and Stuart (1943), and possibly other clinical respiratory infections of yet undetermined etiology, which behave in a manner similar to the common cold in man. The specific bacterial, fungus, and parasitic infections of the respiratory tract, the foreign bodies, vitamin A deficiency, and allergic sensitivities of the respiratory mucous membrane will not be discussed at this time. It should be mentioned also, that in some cases of neural lymphomatosis the nerve apparatus is affected, thus causing some respiratory embarrassment, which is not associated with a discharge from the eyes or air passages.

In addition, there may be also a non-contagious type of common winter cold the etiology of which still remains uncertain.

The term "roup" is still both popular and vague, but is rapidly disappearing from the literature. It is often applied to infectious coryza and other brief respiratory attacks of, sometimes, unknown origin. At times roup is most diécult to differentiate from other kindred respiratory maladies and a clinical diagnosis is not trustworthy.

Unfortunately some of these respiratory diseases have become a perennial problem on certain farms.

The geographic regions of prevalence usually denote some condition peculiar to the area. The incidence of some of these respiratory diseases varies markedly, possibly because of certain extraneous, regional circumstances.

These respiratory diseases occur at all seasons of the year, but with a preference for cold and changeable weather.

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Varying environmental conditions have some effect in altering the permeability of the respiratory mucous membrance. Such conditions have certain important effects upon the susceptibility and response to a disease. There is confirming field evidence to indicate, that adverse environmental conditions may alter the susceptibility of the respiratory epithelium to infection, thus enhancing the natural spread of some of these infections.

It should be stated here, that some rather peculiar ideas exist in the lay mind regarding this group of diseases. Too many assume that these factors originate the specific microorganism which is entirely incorrect, for this would be "spontaneous generation." The following accessory factors may predispose to some of the respiratory diseases.

A chick affected with infectious bronchitis

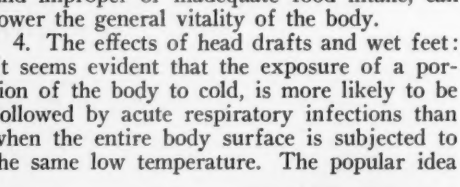
1. Exposure to sudden changes of temperature, lessen the resistance of chickens to infection. Exposure is intensified in young chicks by their habit of crowding together in heaps. This causes overheating of those in the center, while those on the outer surface may be shivering from cold. On scattering, the overheated chicks are soon chilled. It is noteworthy that colds contracted in this manner have little or no contagious tendency.

2. The breathing of vitiated and dusty air: Damp dusty air is a mischievous combination. House dust is more injurious than outside

dust because it is more apt to contain damaging pathogens in greater numbers.

3. Depressed vitality from heavy production, and improper or inadequate food intake, can lower the general vitality of the body.

4. The effects of head drafts and wet feet: It seems evident that the exposure of a portion of the body to cold, is more likely to be followed by acute respiratory infections than when the entire body surface is subjected to the same low temperature. The popular idea



Chickens crowding together intensify exposure

that drafts influence respiratory infections in some individuals is, therefore, not without foundation. Head drafts are more injurious at night when the chickens are roosting due to the crowding which renders them more susceptible to drafts. There is also plenty of truth in the statement that "chickens will not thrive unless their feet are kept dry."

5. Depressed vitality due to insanitary housing conditions, when once established, permits infection by contact to spread with great rapidity. A failure to provide adequate cleanliness in poultry houses is a frequent predisposing factor to some of the respiratory conditions.

While the accepted criteria of proof may be lacking here, the fact remains that there is an impressive amount of field evidence, which accords with the layman's reference to some houses or pens on certain farms as "diseased buildings." It is believed that one or more of the important features of the numerous factors that enter into the proper construction of a building are seriously deficient, in such quarters and they are not conducive to good health throughout the winter months. In the past poultry houses were usually constructed with little regard for ventilation. Today it is most desirable that provision be made for the adequate ventilation of every poultry house that is built.

Epizootiological interests are concerned with how the infectious micro-organisms spread and how they act in their host, although their activity, of course, is determined largely by their physical and chemical properties. Further ocnsideration of the mechanism of transmission of the respiratory diseases involves tracing the infectious agent through the host, a determination of all means of exit, and the relative availability for transmission to a new host.

A consideration of the portals of entrance and means of exit of the respiratory viruses from the infected host has some epizootiological significance. The mucous membranes are favored portals of entry for most of these viruses. The naso-pharynx provides the portal of entry for some of the common ones. This group of viruses generally enter and leave by the same major tract of the body. Most of them gain access by the air passages, and are discharged in the secretions of the respiratory tract. The secretions of the respiratory tract provide the means of exit for many commonly encountered respiratory viruses of chickens and a few may be excreted in the feces. The epizootiological significance of the passage of the virus in the feces remains to be determined.

It is probable that these infections are contracted mostly by direct and indirect contact and by droplet infection. The respiratory virus infections are usually transmitted more or less directly from individual to individual by means of the excretions of the respiratory tract, and most often during the early stages of the disease. Indirect transmission on fomites occurs in many instances. Water and feed may become contaminated and may give rise to sporadic outbreaks of disease. Air-borne infection in the past was believed to be practically limited to the radius of droplet infection. The range of air-borne agents is now thought to be extensive enough to constitute a definite community hazard. Dust in any of its various forms is probably the most important vehicle for transporting infectious agents through the air.

It may be stated here, that some of these infectious agents may owe their continued existence to healthy carriers. Such respiratory diseases are presumably most contagious during the early stages of an attack. Carriers may spread the infection and are suspected in the field. We do not know exactly how long individual birds remain infective, and generally speaking little is actually known concerning carriers. Unfortunately the detection and isolation of these infected individuals in the field is practically impossible.

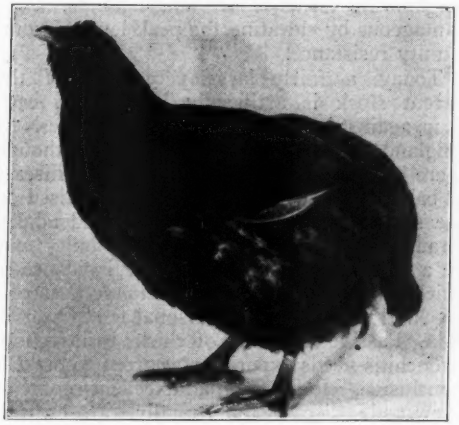
Literature records very little evidence of the importance of wild, flying birds as transmitters of disease, either mechanically or as infected carriers. The appearance of these diseases in widely separated geographic areas may be due to the carriage of the virus over long distances in or on birds. At the same time these birds may not exhibit any symptoms of infection. As yet undiscovered reservoirs of infection in certain wild, flying birds may offer a possible explanation of the continued propagation of some of these virus infections. Thus the agency of wild, flying birds as reservoirs must be considered on epizootiological grounds. Due consideration must be given also to the ground animals for they, too, may be associated with epizootiological problems, related to this group of chicken diseases.

It has been with some degree of reluctance that poultry pathologists have accepted the possibility of direct transmission of any of the respiratory viruses through the egg to chicks from infected parent stock. Field evidence indicating transmission through the egg is generally based on the fact that not infrequently one may observe in some lots of susceptible chicks a respiratory virus infection occurring within the first 24 to 96 hours after hatching, presumably without any contact whatever, with any outside source of contamination. The danger of transmission through the egg would seem more likely during incubation period of the disease, when the micro-organism may still be circulating in the blood stream or for a time during the active stage of the disease, when the same condition may prevail. Investigators have isolated the virus of avian pneumoencephalitis (Newcastle disease) from the yolk of eggs from infected flocks. Yolk material, apparently, is a good source of this virus during the active stage of the disease. It must be remembered that such findings are not conclusive evidence that this d i s e a s e is definitely transmitted through the egg. True egg transmission, such as occurs in pullorum disease ,does not seem likely with any of the known respiratory viruses. Localization of the micro-organism in either female or male reproductive organs, does not seem at all significant. Another remote possibility is the contamination of maturing egg follicles at or about the time of ovulation from chronically infected air sacs.

The indiscriminate movement of infected birds from farms to a diagnostic laboratory *via* the railroad or postal system is of epizootiological concern. A railroad depot or post office should be regarded as a dangerous contact center for young, healthy, susceptible day old chicks, which have just left a clean hatchery and are enroute to their new home. These common carriers should be reserved for the transportation of day old chicks or only healthy stock. This is suggested on epizootiological grounds.

The contagiousness and severity of these respiratory diseases may vary in different epizootics and in different seasons of the year, depending upon the particular micro-organism involved and other factors, not well understood as yet.

One important reason, why the contact respiratory infections spread so rapidly and are so c o m m o n , may be the close association amongst chickens on poultry farms that is normal to poultry husbandry. Such housing methods may, then, be considered as a factor in the



Infectious largyngotracheitis was first described as a disease entity in 1925 by May and Tittsler. Beach in 1931 demonstrated it is due to a filterable virus.

contagion and as contributing to the prevalence of chicken infections, spread by way of the respiratory tract.

Immunity is a significant limiting factor in the prevalence of these respiratory virus infections. The self-limited respiratory virus infections of chickens, at any rate those of known etiology, generally leave the recovered host with a fairly long lasting to permanent immunity. Today it has become a customary practice for poultrymen to dispose of a large percentage of their young adult population for meat purposes at the end of their productive pullet year. As a consequence, a new group of replacements which are highly susceptible make up the new population each year. This rapid restoration of a population of susceptibles, nullifies any transient or permanent immunity, which might have been built up against some of these respiratory virus infections. When adults with virus experience are disposed of

for meat purposes at the end of their productive pullet year, a serious loss results from the fact that the permanent immunity which they have built up against some of these diseases goes to market with them. This is a great disadvantage in itself. The owner of the flock no longer enjoys the constructive phase of the disease, *i. e.* the fewer the susceptibles in a locality, the less prevalent the disease becomes, in that area.

Since active immunization against infectious bronchitis is practiced widely, at least in some of the New England states, the immunity derived from such an attack generally leads to individual protection and thus raises the peak level of flock resistance. Exposure of a large number of young adults to the virus, on various neighboring farms before housing time, is advantageous by elevating the peak level of community resistance.

Today, a fairly large percentage of the parent stock is artificially immunized, each year, against infectious bronchitis in some New England states, and now it seems as though there is a much lower incidence of this disease in baby chicks, even though they are raised on the same premises with the recovered adults. Transitory, congenital, passive immunity may be a factor in the uniformly low incidence in chicks that are hatched from immune parent stock. This is purely a personal field observation. Passive immunity of chicks to infectious bronchitis needs experimental proof to make it conclusive. However, in an excellent report on Newcastle disease by Brandly, Moses, and Jungherr (1946) they state that, "congenital passive immunity during the first month of life was found to interfere materially with active immunity response of the chicks to specific infection or to vaccination." They also reported, "the serum antibody titer and the immunity of chicks hatched from eggs laid by Newcastle-immune hens, remained at a peak level during the two weeks post-hatching. Subsequently there was a rapid decline in titer and resistance; a small proportion of chicks remaining refractory to infection after five or six weeks."

The economic losses sustained from any of the respiratory virus diseases are probably dependent upon variations in the severity of the primary infection, and on differences in the secondary organisms, which can become associated with these diseases. Other influencing factors are: age, rate of production, environment, and month of year.

The eventual control and eradication of some of these respiratory diseases may involve the elucidation of problems that are poorly understood today. In the present state of knowledge, the most dependable and the most generally employed method of combating the respiratory diseases, as a group, is to limit the spread of the infectious agents by preventing unnecessary risk of exposure, limiting dissemination of the infectious agent, and eliminating known reservoirs of infection.

The achievements of the past 20 years in control of the respiratory diseases, have been most encouraging. There is still a long way to go before they are all controlled, but an excellent start has been made toward this objective. The formula for future advances must evolve over many years, and be the rounded attack that comes from abundant and discerning work in the field and in the laboratory.

References

Brandly, C. A., Moses, H. E., and Jungherr, E. L.; Transmission of antiviral activity *via* the egg and the role of congenital passive immunity to Newcastle disease in chickens. *Am. J. Vet. Res.*, 25, pp. 333-342. 1946.

Delaplane, J. P., and Stuart, H. O.; The propagation of a virus in embryonated chicken eggs causing a chronic respiratory disease of chickens. *Am. J. Vet. Res.*, 13, pp. 325-332. 1943.

Egg Production of Farm Flocks Increased

From 1940 to 1946 the average annual egg production in the North Central States increased 20 eggs per hen. Earlier hatched chicks, better balanced rations, improved housing and better care and practices were responsible.

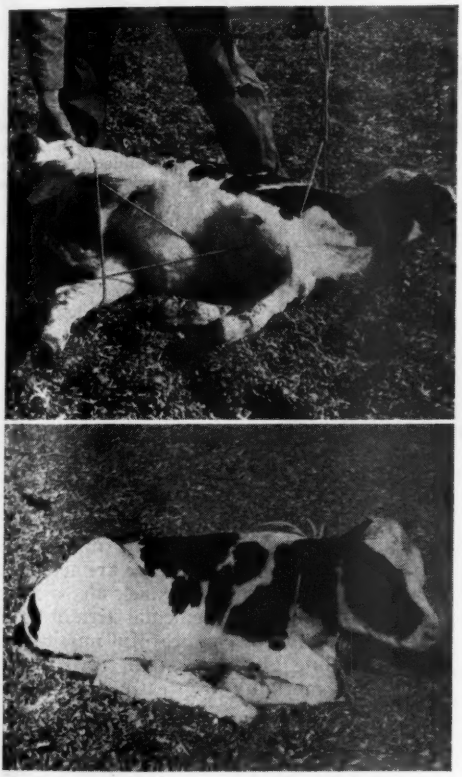
Cecal Coccidiosis in Chickens

For the treatment of outbreaks of cecal coccidiosis in chickens, Swales recommends 0.4 to 0.5% of sodium sulfamerazine in the dry mash for three to five days or 0.2 to 0.25% in the drinking water for an equal period. During the medication period only medicated feed or water is provided. These dosage schedules appear to be sufficient to control outbreaks, even after cecal bleeding has begun. Of course, the birds must consume the feed or water to be benefited by it, which means treatment must begin before they are too sick to eat or drink. In studies undertaken to determine the prophylactic value of sulfamerazine against coccidiosis one-half the foregoing dosage commenced at the beginning of exposure and continued for six days was effective. It prevented the development of clinical coccidiosis yet permitted sufficient infection to establish immunity to *Eimeria tenella*.
—S. F. Scheidy, V.M.D.

Clinical Reports

Restraining Calves or Sheep

A humane and very useful method of restraint which I have used for calves and sheep is shown in the accompanying illustrations. This means of restraint allows for prolonged intravenous work, prevents an animal from moving about, and is particularly advantageous where one wishes to haul a calf some distance



Above: The animal is recumbent only to show the arrangement of the rope. Normally, tying is done with the animal standing.
Below: Calf restrained. Note resemblance to a normal resting position.

in a car or truck. The method is simple and the result so inconspicuous that it is unnoticed by the casual observer. I have not observed any other veterinarian using it. It possesses the advantage of allowing the animal to assume a natural resting position and thus it does not provoke resistance.

A ten-foot piece of sash-cord or small rope is all that is required. Begin by placing the midpart of the rope across the anterior of the hind legs just above the hocks. Then carry the ends around the hocks and pass them forward between the hind legs above the midpart of the rope. Continue the ends forward between the front legs, one in front of each shoulder, and tie with a simple knot on the dorsum of the neck. The hind legs are drawn as far forward as possible by pulling on the ends of the rope, which are then tightened and tied in a bow knot.

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Distemper Immunization in Everyday Practices

The virus of canine distemper is so widespread that it is practically impossible to raise a dog in most urban areas with out exposing it to this infection. This is due to the concentration of dogs in such areas and the consequent close association. As a result canine distemper is the most common infectious disease of the dog. Not only the case rate, but the fatality rate too, is high.

Until recently the practitioner's experience in attempting to immunize dogs against distemper was often a heart-breaking one. How often we went through the routine of vaccination for a friend or neighbor, whom we saw everyday, only to see his dog contact distemper and die! Many times we lost not only a patient but a client as well, and on occasion even a friend.

Outstanding improvements have been made in distemper vaccines during the past few years. The use of distemperoid virus for immunization purposes at the hospital (Bel-Air Animal Hospital) during 1947 resulted as follows:

Number of dogs vaccinated	327
" " " no reaction	168
" " " mild reaction	93
" " " pronounced reaction	47
" " " lost	19

While dogs of any age may be vaccinated, the ideal age for immunization for normal, healthy animals is two to three months.

Before vaccination is started, certain fundamental precautionary measures must be observed. For good results the dog must be in good health and free from intestinal parasites. Any symptoms of malnutrition are poor portents for good immunity.

The vaccine, after being properly mixed is usually injected into the subcutaneous tissue in the areas over the ribs or at the base of neck.

These sites are chosen because of convenience and good absorption. After the injection we advise the client to massage the area thoroughly for better absorption, and greater immunity.

We have also given the vaccine intramuscularly, especially when the animal is left in the hospital. This insures faster and more complete absorption. The results are equally good.

For immunization, the dosage is 1mg per pound of body weight in a single dose, except we find in Chihuahuas we can split the dose and vaccinate at six months of age.

Our recommendation to the client at vaccination is to feed only meat supplemented with vitamins and minerals. We advise against bathing for some time, or chilling or exposure during cold nights.

If puppies, and to a less degree in older dogs, are fed milk and not much meat, the milk has a tendency to aggravate and prolong the diarrhea, when the reaction occurs. This in turn weakens the dog and makes the reaction more severe; setting up a vicious cycle.

When animals that have not been vaccinated, are brought to the hospital for spaying or castration, we usually wait two days for recovery from the effects of surgery and then give distemperoid virus for immunization against distemper. This is particularly effective in long term boarders, where we would be compelled to administer serum every 10 to 14 days to keep the animal well.

Dogs that exhibit a mild to moderate reaction, anorexia, temperature rise, listlessness, and diarrhea for one to three days, apparently develop grater immunity than those animals which no clinical reaction.

This brings to mind a case where the owner, who had just bought two champion setters, brought them to the hospital for a check over but he was skeptical of distemper vaccination. I strongly advised vaccination, since the dogs were in good shape physically and free from intestinal parasites. One pup developed a mild reaction and solid immunity; the other showed no reaction whatsoever. Four months later this latter pup developed a high fever, cough, diarrhea and all the other symptoms of distemper. It was brought to our hospital after first being treated at another hospital—too late for a double dose of distemperoid virus. It died with convulsions and chorea.

In our experience dogs that show a mild to moderate reaction develop a rapid and permanent immunity.

As a therapeutic agent for distemper, the greatest value of the vaccine has been noted in the early stages of the disease, and where the animal wasn't in poor condition from an improper diet. By using double or triple the normal dose, 2mg to 3mg, of distemperoid virus per pound body weight we are able to cut down the duration of the attack and are thus relieved of much supplemental treatment. A large dose of the vaccine, careful nursing, and proper feeding give more than favorable results. The mortality is greatly lessened, but this is influenced by the stage of distemper when the animal is brought to the hospital.

Of 89 cases in all stages of distemper, which were treated with distemperoid virus, 12 died.

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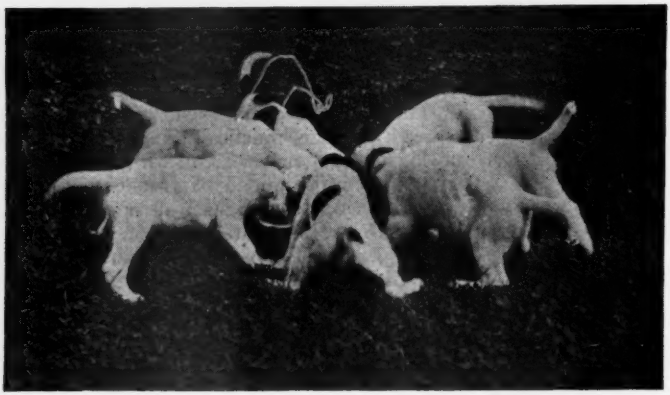


If infected puppies are fed milk and not much meat, the milk has a tendency to aggravate and prolong the diarrhea

Dogs After Dark

To the dyed-in-the-wool horse bettor, dog racing is evidence that man will bet on anything that moves—be it kangaroos, chimpanzees or jumping frogs. Certainly a dog track is no place to admire the look of a dog: his face is wrapped in a muzzle that looks something like an air-raid warden's mask. But dog racing is an $81 million-a-year business in Florida.—*Time Magazine.*

Abstracts

Oxalic Acid a General Hemostatic Agent

In vitro, oxalic acid is an anticoagulant; *in vivo* it is a potent agent for hastening the coagulation of blood in accidental and surgical wounds.

The author[23] determined the normal coagulation time of the blood of 20, apparently healthy, horses and ascertained it to range between eight and 14 minutes—average 10 minutes and 33 seconds. The animals were given 1.5 to 2gm of oxalic acid intravenously in 30 to 40cc of sterile distilled water, and the coagulation time determined at 15 minute intervals till it returned to normal—four to six hours.

Following the oxalic acid injection the coagulation time decreased abruptly to less than one minute (range 24 to 59 seconds), within 15 minutes after the injection. Thereafter it rose regularly reaching normal in four to six hours. The average post injection coagulation time in the 20 normal horses was 40.25 seconds, or only one-sixteenth the average blood clotting time for these animals prior to the injection of oxalic acid.

No ill effects were noted in any of the animals as a result of the injections. This accords with observations on thousands of persons and dogs, which indicates that oxalic, although a mortal poison under some circumstances, in proper dilution and dosage is practically harmless when injected into the blood stream.

Studies on Canine Pharyngo-Laryngo-Tracheitis

This investigation[21] was of an upper-respiratory disease of dogs first described, five years ago by Whitney.[22] "The increasing prevalence of this disease has inflicted an increasing economic hazard to dog breeders and owners." Apparently the disease is not prevalent in this country except in New England or perhaps it is frequently unrecognized elsewhere. British writers describe a similar condition in England as a type of encephalitis, and speak of it being very prevalent among racing greyhounds. Some have hazarded an opinion that it is due to a virus which is a near relative of the virus that causes human poliomyelitis.

Although nazal washings from a large number of naturally and experimentally infected dogs were examined no pathologically significant bacteria were found. The disease was readily communicated by nasal washings of infected dogs but not by bacteria free filtrates of these washings. The author was unable to produce the disease in mice, probably because of bacterial contamination. In one instance a dog was infected by a bacteriologically sterile chorio-allantoic fluid from a chick embryo. Thirteen serial passages were made in dogs using nasal washing for the infective agent and spraying it intranasally.

The author concludes the syndrome is not due to a bacterium. It is probably due to a virus but that thesis requires requires more supportive evidence.

Rabies in Cattle Due Chiefly to Infection by Foxes

The control and eradication of rabies in man and farm animals has so long been thought of as being a problem of eliminating the disease in dogs, that a report by Zeissig,[20] of extensive losses in cattle due to inoculation by rabid foxes comes as a surprise. However, a plague of rabies spread by infected foxes should not occasion surprise, since in South Africa the mongoose and perhaps other small rodents precede the dog in importance in disseminating this disease and in South America the vampire bat is the exclusive purveyor of one type of rabies, to man and herbivorous animals. Having happened elsewhere of course "it can happen here."

Rabies has been a public health menace and an animal disease problem in New York for many years. The number of cases reported, 1925 to 1947, averaged approximately 210 yearly and totaled 4811 to September 24, 1947. A striking factor in the disease epidemiology over these years, is the abrupt change in the picture that came about five years ago. During the first 18 years for which records are available (1925-1942), of 1985 cases of rabies reported, 1943, 97.9%, were in dogs; 16, 0.8%, in cattle; eight, 0.4%, in humans, one case in foxes and 17 cases in all other animals.

During the years 1943 to September 24, 1947 the yearly average was 588 cases, nearly three times as great as in the preceding 18 years, but the distribution of the cases among the various species was even more striking than the increase in the number of cases. For the five-

23 Gonzaga, Arcadio C., Assistant Professor Department of Pharmacology, College of Veterinary Science, University of the Philippines. India Vet. J. 24:3, pp. 151-156 (November, 1947).

21 Gustafson, Walter E., "Preliminary Studies on the Agent of Canine Pharyngo-laryngo-tracheitis," Yale Journal of Biology, 20:2, pp. 185-196 (December, 1947).

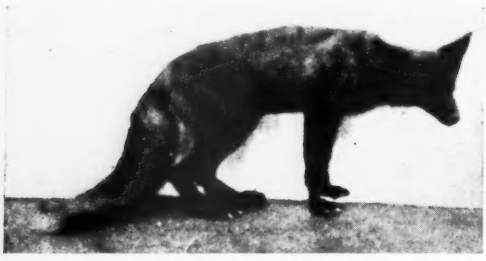
22 Whitney, Leon F., "House-dog Disease," Vet. Med., 38:11, pp. 419-429 (November) 1943.

20 Korns, R. F., and Zeissig, A., "Dog, Fox and Cattle Rabies in New York State," American Journal of Public Health, 38:1, pp. 50-65 (January, 1948).

year period the number of cases in dogs was 46% of the total cases as contrasted with 97.9% in the preceding period; the number of cases in cattle was 751, 150 times the average number in the preceding period; the number in humans was but two, and in other animals 122 cases on more than 24 times the average of the preceding period. However, the greatest differences occurred in foxes. In the preceding 18-year period only once case was reported in this animal, but in this five-year period the cases numbered 592.

The replacement of dogs by the fox as the principal vector of rabies to heterologous species moved at an accelerated pace during the period. Thus in 1943 there were 176 cases in dogs, 10 in cattle and one in a fox. In 1947 there were 40 cases in dogs, 167 in cattle and 218 in foxes.

Apparently two factors became effective in the rabies situation in 1943 and continued during the succeeding years, that had not obtained theretofore. (1) The widespread vaccination



of dogs sponsored by the state department of public health markedly reduced the prevalence of the disease among dogs as compared with the prevalence in other species, and (2) a strain of rabies virus readily communicable among foxes developed. There seems little doubt that some rabies must have occurred among foxes all along but not in sufficient amount to attract attention so long as it was dependent upon bites of rabid dogs. When a strain of virus developed that is readily communicable from fox to fox, the increase in the disease among these animals became spectacular. The same phenomenon has been observed in Georgia and Alabama.

The epidemiological evidence and clinical observation leads the authors to think that the disease in cattle is chiefly due to infection by rabid foxes. It appears that 98% of the increase in cattle should be charged to infection from foxes. Likely some part of the disease in dogs and a majority of the cases in "other animals" also were due to bites of rabid foxes.

Book Reviews

Diseases of Poultry, with specialist chapters on Poultry Husbandry, by *W. P. Blount*, M.R.C.V.S. 580 pages. Published by The Williams and Wilkins Co., Baltimore. 1947. Price, $6.00.

As the title indicates, this text deals, not only with disease, but also with breeds, incubation, nutrition and general husbandry; nearly one-fourth of the book (134 pages) being devoted to poultry husbandry. This section, written by specialists in their fields, applies to poultry raising in Great Britain.

Except for the section on husbandry, the treatise is similar to other textbooks on poultry diseases. The author has attempted to include the diseases of all avian species, and includes chapters by 24 specialists in particular fields of poultry husbandry.

A unique section of the book is the final one on "Poultry Diseases in Some Other Countries." Short resumés of the disease situations in South Africa, Australia, Basutoland, Ceylon, Cyprus, Egypt, France, Gold Coast, Hawaii, India, Jamaica, Palestine, Sudan, Trinidad and Tobago are written by men familiar with the poultry problems of these countries. In general, the diseases listed for most of the countries are the same as we find in the United States and recommendations for their control are similar.

The book is well written, but since the problems and recommendations are largely for the British Isles, it will not take the place of books already on the market in this country. For the veterinarian who is interested in an additional reference book, it is recommended. —*W. R. H.*

Bulletins, Circulars, Reports, etc.

Self-Feeding Lambs with Four Different Mixtures of Ground Alfalfa and Cracked Corn.—Article 30-28, Michigan Agr. Exp. Sta., East Lansing.

The Use of Disinfectants on the Farm.—A guide for the selection of disinfectants, preparation of solutions, application and uses. Farmers' Bul. No. 1991. USDA, Washington 25, D. C.

The Morphology and Behavior of Neoplastic Mast Cells Cultivated in Vitro.—By *G. H. Paff*, Ph.D., *Frank Bloom*, D.V.M., and *Christopher Reilly*. Reprint *J. Exp. Med.*, 86:2, pp. 117-124. 1947.

Your New Meat Cook Book.—The 1948 edition contains 81 recipes for preparing meat dishes of beef, pork, veal, lamb, variety meats, sausages, etc., with step-by-step instructions on meat cookery. Free on request to the National Livestock and Meat Board, 407 South Dearborn Street, Chicago.